(19)日本国特許庁(JP)　(12)公表特許公報(A)　(11)特許出願公表番号
特表2004-534921
(P2004-534921A)
(43)公表日　平成16年11月18日(2004.11.18)

(51)Int.Cl.[7]	F I	テーマコード（参考）
F01D 9/02	F01D 9/02 101	3G002

審査請求 未請求　予備審査請求 有　（全 77 頁）

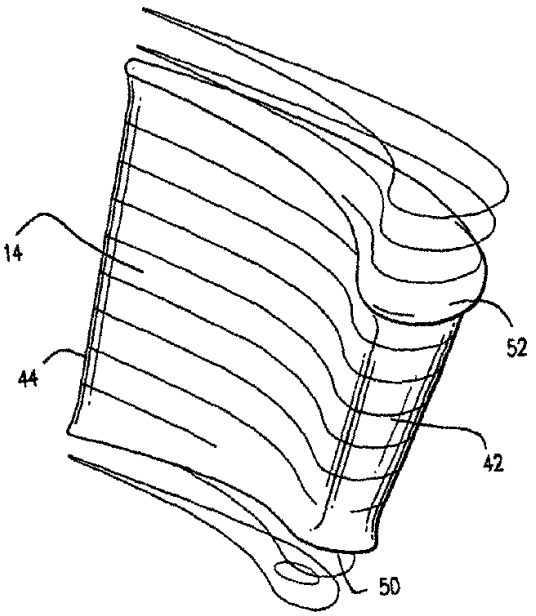
(21)出願番号	特願2003-512537(P2003-512537)
(86)(22)出願日	平成14年7月9日(2002.7.9)
(85)翻訳文提出日	平成16年1月9日(2004.1.9)
(86)国際出願番号	PCT/US2002/021887
(87)国際公開番号	WO2003/006797
(87)国際公開日	平成15年1月23日(2003.1.23)
(31)優先権主張番号	09/903,853
(32)優先日	平成13年7月13日(2001.7.13)
(33)優先権主張国	米国(US)
(81)指定国	EP(AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE,SK,TR),CN,JP,KR

(71)出願人　390041542
ゼネラル・エレクトリック・カンパニイ
GENERAL ELECTRIC COMPANY
アメリカ合衆国、ニューヨーク州、スケネクタデイ、リバーロード、１番
(74)代理人　100093908
弁理士　松本　研一
(74)代理人　100105588
弁理士　小倉　博
(74)代理人　100106541
弁理士　伊藤　信和

最終頁に続く

(54)【発明の名称】第２段タービンノズル翼形部

(57)【要約】
第２段ノズル（１２）は、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った翼形部輪郭を含むベーン（１４）を有し、その場合、Ｘ、Ｙ及びＺ値は、前記翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させてＺ座標値に対して定められる。Ｘ、Ｙ及びＺ値は、拡大又は縮小されたノズル用の翼形部セクションを得るために、同一の定数又は数値の関数として拡大縮小されることができる。



【特許請求の範囲】
【請求項１】
任意の翼形部表面位置に対して垂直な方向に±０．１００インチ（２．５４ｍｍ）の範囲内にあるエンベロープの翼形部の形状をしたノズルベーン（１４）を有するタービンノズル（１２）であって、
前記翼形部が、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有し、その場合、Ｘ、Ｙ及びＺ値は、前記翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させて該Ｚ座標値に対して定められ、
Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成するようになっている、
ことを特徴とするタービンノズル。
【請求項２】
タービンの第２段の一部を形成することを特徴とする、請求項１に記載のタービンノズル。
【請求項３】
翼形部の形状をしたノズルベーン（１４）を有するタービンノズル（１２）であって、
前記翼形部が、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有し、その場合、Ｘ、Ｙ及びＺ値は、前記翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させて該Ｚ座標値に対して定められ、
Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成し、
前記Ｘ、Ｙ及びＺ値が、拡大又は縮小されたノズル翼形部を得るために、同一の定数又は数値の関数として拡大縮小されるようになっている、
ことを特徴とするタービンノズル。
【請求項４】
タービンの第２段の一部を形成することを特徴とする、請求項３に記載のタービンノズル。
【請求項５】
複数のベーン（１４）を有するタービンノズル（１２）を含むタービンであって、
前記ベーンの各々が、任意の翼形部表面位置に対して垂直な方向に±０．１００インチ（２．５４ｍｍ）の範囲内にあるエンベロープの翼形部の形状をしており、前記翼形部が、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有し、その場合、Ｘ、Ｙ及びＺ値は、前記翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させて該Ｚ座標値に対して定められ、
Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成するようになっている、
ことを特徴とするタービン。
【請求項６】
前記タービンノズルが、該タービンの第２段を含むことを特徴とする、請求項５に記載のタービン。
【請求項７】
前記タービンノズルが、６０個のベーン（１４）を有していることを特徴とする、請求項５に記載のタービン。
【請求項８】
複数のベーン（１４）を有するタービンノズル（１２）を含むタービンであって、
前記ベーンの各々が、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有する翼形部の形状をしており、その場合、Ｘ、Ｙ及びＺ値は、前記翼形部の半径方向最内側の空気力学的セクションから始まりかつ次に

そのセクションに相対させて該Ｚ座標値に対して定められ、
Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成し、
前記Ｘ、Ｙ及びＺ値が、拡大又は縮小されたノズル翼形部を得るために、同一の定数又は数値の関数として拡大縮小されるようになっている、
ことを特徴とするタービン。
【請求項９】
前記タービンノズルが、該タービンの第２段を含むことを特徴とする、請求項８に記載のタービン。
【請求項１０】
前記タービンノズルが、６０個のベーンを有していることを特徴とする、請求項８に記載のタービン。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、ガスタービン段用のタービンノズルに関し、具体的には、第２段タービンノズルの翼形部輪郭に関する。
【背景技術】
【０００２】
近年、最新式のガスタービンは、燃焼温度が高くなる傾向があり、様々なタービン部品の冷却を改善する努力がなされている。本出願人の特定のガスタービン設計においては、空気冷却を使用する高出力タービンを目下開発中である。タービンバケット及びノズルの設計及び構造には、空気力学的効率と同時に空気力学的及び機械的な負荷を最適化させることが要求されることが分かるであろう。
【発明の開示】
【発明が解決しようとする課題】
【０００３】
本発明の好ましい実施形態によると、タービン段、好ましくは第２段用の固有のタービンノズル翼形部輪郭が提供され、この翼形部輪郭は、負荷要件において必要な効率を達成し、それによって改良されたタービン性能が得られるような、固有の点の軌跡によって定められる。以下に示す表１のＸ、Ｙ及びＺ座標によって与えられる基準輪郭は、この固有の点の軌跡を定めていることを理解されたい。表１においてインチ単位で与えられた座標は、ノズルベーンの各断面に対する低温すなわち室温輪郭のためのものである。各々の定められた断面は、隣接する断面と滑らかに結合されて、完全な翼形部形状を形成する。ノズルは使用中に高温になるので、応力及び温度の結果として、ノズルベーンの輪郭が変化することになることも分かるであろう。従って、低温すなわち室温輪郭は、製造目的のためにＸ、Ｙ及びＺ座標によって与えられる。製造されたノズル翼形部輪郭は、以下の表に示した基準翼形部輪郭とは異なる可能性があるために、基準輪郭に沿った任意の表面位置対して垂直な方向でありまた任意の皮膜を含む、該基準輪郭から±０．１００インチ（２．５４㎜）の距離により、この設計のための輪郭エンベロープが形成される。この設計は、このようなばらつきに対して強く、機械的及び空気力学的機能を損なうこともない。
【０００４】
翼形部は、他の類似のタービン設計に取り入れるために幾何学的に拡大又は縮小することが可能であることも理解されたい。その場合、下に与えられた基準翼形部輪郭のＸ、Ｙ及びＺ座標は、同一の定数又は数値の関数となる。すなわち、表に示したＸ、Ｙ及びＺ座標値を、同一の定数又は数値により乗算又は除算して、翼形部断面形状を維持しながらノズル翼形部輪郭の拡大又は縮小バージョンを得ることができる。
【特許文献１】
米国特許６，４５０，７７０公報
【特許文献２】
米国特許６，４６１，１０９公報

【特許文献３】
米国特許６，４６１，１１０公報
【課題を解決するための手段】
【０００５】
本発明による好ましい実施形態においては、任意の翼形部表面位置に対して垂直な方向に±０．１００インチ（２．５４ｍｍ）の範囲内にあるエンベロープの翼形部の形状をしたノズルベーンを有するタービンノズルが提供され、該翼形部は、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有し、その場合、Ｘ、Ｙ及びＺ値は、翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させてＺ座標に対して定められ、Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成するようになっている。
【０００６】
本発明による別の好ましい実施形態においては、翼形部の形状をしたノズルベーンを有するタービンノズルが提供され、該翼形部は、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有し、その場合、Ｘ、Ｙ及びＺ値は、前記翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させてＺ座標値に対して定められ、Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成し、Ｘ、Ｙ及びＺ値が、拡大又は縮小されたノズル翼形部を得るために、同一の定数又は数値の関数として拡大縮小されるようになっている。
【０００７】
本発明による更に別の好ましい実施形態においては、複数のベーンを有するタービンノズルを含むタービンが提供され、該ベーンの各々が、任意の翼形部表面位置に対して垂直な方向に±０．１００インチ（２．５４ｍｍ）の範囲内にあるエンベロープの翼形部の形状をしており、該翼形部が、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有し、その場合、Ｘ、Ｙ及びＺ値は、翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させて該Ｚ座標値に対して定められ、Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成するようになっている。
【０００８】
本発明による更に別の好ましい実施形態においては、複数のベーンを有するタービンノズルを含むタービンが提供され、該ベーンの各々が、表１にインチ単位で記載したＸ、Ｙ及びＺのデカルト座標値に実質的に従った被覆されていない基準輪郭を有する翼形部の形状をしており、その場合、Ｘ、Ｙ及びＺ値は、翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させてＺ座標値に対して定められ、Ｚ距離における輪郭が、互いに滑らかに結合されて完全な翼形部形状を形成し、Ｘ、Ｙ及びＺ値が、拡大又は縮小されたノズル翼形部を得るために、同一の定数又は数値の関数として拡大縮小されるようになっている。
【発明を実施するための最良の形態】
【０００９】
次に図１を参照すると、ここには全体を符号１０で示すタービンの一部分が示されており、該タービンは、全体を符号１２で示す第２段ノズルを有する。ノズル１２は、互いに円周方向に間隔を置いて配置された翼形部形状又は輪郭を有する複数のベーン１４を含む。図示したタービン１０は、３つの段、すなわち、複数の円周方向に間隔を置いて配置されたノズルベーン１８と回転可能なタービンホイール２２の周りに円周方向に間隔を置いて配置されたバケット２０とを有する第１段１６と、複数の円周方向に間隔を置いて配置されたノズルベーン１４と第２段ホイール２６上に取付けられた複数の円周方向に間隔を置いて配置されたバケット２４とを含む第２段ノズル１２と、ノズルベーン３０と第３段ホイール３４上に取付けられた複数の円周方向に間隔を置いて配置されたバケット３２とを支持する第３段２８とを備える。ノズルベーン及びバケットは、ガスがタービンを通って

矢印３６の方向へ流れる、該タービン内の高温ガス通路内に位置していることが分かるであろう。図示するように、第２段１２のノズルベーン１４は、それぞれ内側及び外側バンド３８及び４０間に配置され、該内側及び外側バンドによってノズルには、ロータ軸線の周りの環状空間が形成される。

【００１０】

図２を参照すると、ノズルベーン１４は、前縁４２と後縁４４とを有し、またノズルベーンセグメントは、該ノズルベーンセグメントをタービンの非回転ケーシングに固定するためのフック４６、４８を有する。ノズルベーンは、該ベーンを通して冷却媒体を流すための、該ベーンを貫通した様々な通路を有することが分かるであろう。この特定タービンの第２段ノズルの図示した好ましい実施形態においては、該第２段を形成する６０個のノズルベーンがある。

【００１１】

更に図２を参照すると、ここには第２段用のノズルベーン１４が示されており、この第２段用のノズルベーンは、Ｘ、Ｙ及びＺ値のデカルト座標系によって定められた翼形部輪郭を有する。座標値は、以下の表１においてインチ単位で記載されている。デカルト座標系は、直交関係のＸ、Ｙ及びＺ軸を有し、この場合、Ｘ、Ｙ及びＺ値は、翼形部の半径方向最内側の空気力学的セクションから始まりかつ次にそのセクションに相対させてＺ座標に対して定められる。Ｚ方向の選ばれた位置におけるＸ及びＹ座標値を定めることによって、翼形部１４の輪郭を確定することができる。Ｘ及びＹ値を滑らかな連続した円弧で接続することにより、各距離Ｚにおける各輪郭断面が決定される。距離Ｚ間の様々な表面位置における表面輪郭が、互いに滑らかに接続されて翼形部を形成する。下表１に示した表の値は、インチ単位で記載されており、周囲温度、非作動又は非高温状態における翼形部輪郭を表しており、また被覆されていない翼形部のためのものである。符号規則により、デカルト座標系で一般的に使用されるように、Ｚ値に対して正の値が割当てられ、またＸ及びＹ座標値に対しては正及び負の値が割当てられる。

【００１２】

表１の値は、翼形部の輪郭を決定するために小数点以下４桁まで作成されかつ示されている。数値が小数点以下４桁まで示されていない場合には、右側に０を加えて数値を小数点以下４桁まで完成させる。更に、翼形部の実際の輪郭には、考慮しなければならない一般的な製造公差と皮膜とが存在する。従って表１に示した輪郭の値は、基準翼形部のためのものである。それ故、一般的な製造公差つまりプラス又はマイナス値と皮膜厚さとが下表１に示したＸ及びＹ値に加算されることが分かるであろう。従って、翼形部輪郭に沿った任意の表面位置に対して垂直な方向に±０．１００インチ（２．５４ｍｍ）の距離が、この特定のノズルベーン設計及びタービンに対する翼形部輪郭エンベロープを形成する。好ましい実施形態においては、下表１に示したノズルベーンの輪郭は、タービンの第２段用のものである。そのような輪郭を有する６０個のノズルベーンが、ロータ軸線の周りに互いに等しい間隔を置いて配置されて、第２段を構成する。

【００１３】

下表１にインチ単位で示した座標値は、好ましい基準輪郭エンベロープを提供する。

【００１４】

【表１－１】

表1

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
			-0.0565	-1.3578	12.5068
0.0096	-1.334	13.5512	0.0056	-1.331	11.4454
0.5594	-1.4939	12.4258	0.0134	-1.4932	13.5507
0.9047	-1.5942	11.3272	-0.061	-1.4472	12.5074
0.0541	-1.3432	12.4922	-0.0731	-1.3947	11.4558
0.1887	-1.3822	11.4214	0.2226	-1.5889	12.4701
-0.0733	-1.4217	13.5621	0.0605	-1.5135	11.4382
-0.0691	-1.3783	12.5084	0.4265	-1.4564	13.4964
-0.0565	-1.3573	11.4536	8.6367	-5.1815	12.4172
0.1447	-1.5533	13.5335	2.771	-2.882	13.1882
0.0095	-1.4907	12.4981	2.1294	-2.5304	12.2194
-0.0617	-1.4447	11.4543	1.5553	-2.2361	11.2417
0.9513	-1.6079	13.4274	6.6906	-3.6984	12.673
0.2123	-1.5838	11.4183	4.2524	-3.9336	12.9935
0.201	-1.389	13.5261	8.7328	-5.467	11.3514
-0.0565	-1.3582	13.5599	3.5559	-3.4153	12.0319
0.2943	-1.4154	12.4607	8.9307	-6.2124	10.2722
0.5449	-1.4882	11.3745	2.8732	-2.9772	11.0685
-0.0312	-1.3386	12.5034	4.4628	-2.7098	12.9658
0.0512	-1.341	11.4394	5.5365	-5.2716	12.8247
-0.0314	-1.4726	13.5566	6.9618	-3.8661	11.5842
-0.0729	-1.4197	12.5089	4.9181	-4.5906	11.8528
-0.0686	-1.3776	11.4552	7.5766	-4.3299	10.4502
0.1367	-1.5493	12.4814	4.2723	-4.0002	10.8846
0.0056	-1.4883	11.4454	2.444	-2.0409	13.2312
0.574	-1.4995	13.477	4.7975	-2.8339	11.8687
0.0571	-1.3455	13.545	5.9341	-6.0731	11.7193
0.7283	-1.5431	12.4036	5.5578	-3.1448	10.7156
-0.0696	-1.3791	13.5617	5.4333	-5.3023	10.7319
0.1153	-1.3617	12.4842	2.7532	-2.1396	12.1374
0.2859	-1.4112	11.4086	0.4443	-1.692	12.4409
-0.0744	-1.3972	13.5623	3.4482	-2.3617	10.9929
-0.0691	-1.3783	12.5084	9.3299	-6.4743	12.326
-0.0321	-1.3382	11.4504	1.9286	-2.4132	13.299
0.0718	-1.5199	13.5431	1.1582	-1.6682	12.3471
-0.0337	-1.4702	12.5038	1.3627	-2.1335	12.3202
-0.0725	-1.4178	11.4557	1.6693	-1.8193	11.2267
0.129	-1.5452	11.4292	0.8995	-1.9092	11.3279
0.3027	-1.4195	13.5127	7.9247	-4.503	12.5108
-0.0302	-1.3391	13.5565	3.3645	-3.262	13.1102
0.4152	-1.4515	12.4448	2.6819	-2.8449	12.1468
0.7098	-1.5368	11.3529	2.0588	-2.503	11.1755
0.0076	-1.3325	12.4983	5.8109	-3.2613	12.7886
0.111	-1.3589	11.4316	4.8021	-4.4333	12.9212
-0.0603	-1.4496	13.5604	8.112	-4.7325	11.433
-0.0738	-1.396	12.509	4.1275	-3.8537	11.9568
-0.0686	-1.3776	11.4552	8.5338	-5.3606	10.3244
0.2332	-1.5941	13.5218	3.4463	-3.3556	10.9931
0.066	-1.5167	12.4907	3.6139	-2.4109	13.0774
-0.036	-1.4678	11.4509	5.9368	-5.8988	12.7721
0.7469	-1.5492	13.4543	6.1189	-3.4056	11.695
0.1196	-1.3644	13.5368	5.3828	-5.1423	11.7917
0.9279	-1.6012	12.3774	6.8079	-3.7908	10.5512
-0.0696	-1.3791	13.5617	4.7777	-4.4834	10.8181
0.1948	-1.3856	12.4737	1.7532	-1.8383	13.322
0.4041	-1.4465	11.393	0.3386	-1.6428	13.508

【００１５】

【表１－２】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
3.9403	-2.5232	11.9814	4.3627	-2.672	11.9258
4.689	-2.7911	10.8298	5.1258	-2.9619	10.7724
5.7718	-5.9156	10.6874	5.6145	-5.6022	10.7081
1.1765	-2.0386	13.3978	7.929	-4.6412	10.4039
2.0333	-1.9235	12.232	0.9647	-1.9372	13.4257
0.7479	-1.8352	12.401	2.3859	-2.0281	12.1857
2.6875	-2.1237	11.0929	0.5854	-1.7582	12.4224
0.4272	-1.6839	11.39	3.0609	-2.2388	11.0438
8.9331	-5.5753	12.3782	0.3113	-1.6298	11.4053
2.4827	-2.7137	13.2261	9.1701	-6.0076	12.347
1.8649	-2.3893	12.2542	2.2017	-2.5577	13.2631
1.1296	-1.6604	11.2977	1.6092	-2.2572	12.2878
1.3167	-2.1149	11.2731	1.3844	-1.7355	11.2642
7.1166	-3.9434	12.617	1.0981	-2.0062	11.3018
3.964	-3.6997	13.0314	7.5296	-4.2103	12.5627
8.9669	-5.8883	11.3206	3.6678	-3.476	13.0704
3.2599	-3.2103	12.0708	9.13	-6.3422	11.2991
2.5948	-2.808	11.1051	2.9681	-3.0207	12.1092
4.9062	-2.879	12.9075	2.323	-2.6503	11.1408
5.3063	-4.9794	12.855	5.3609	-3.0643	12.8478
7.3648	-4.128	11.5312	5.0608	-4.7002	12.8872
4.6652	-4.3336	11.8861	7.75	-4.4157	11.4806
4.0048	-3.7753	10.9197	4.4011	-4.0881	11.9208
2.8195	-2.1555	13.1819	8.2512	-4.984	10.3615
5.2433	-3.0118	11.8101	3.729	-3.5607	10.956
5.7747	-5.7486	11.7402	3.2097	-2.2783	13.1306
5.9836	-3.3421	10.6596	6.0981	-6.2346	12.7509
5.2314	-5.0161	10.7585	5.6843	-3.2017	11.7521
1.1872	-1.6757	13.3964	5.5896	-5.4384	11.7646
0.6073	-1.7681	13.4727	6.4009	-3.5567	10.6047
3.135	-2.2584	12.0872	5.0121	-4.7433	10.7873
0.3248	-1.6363	12.4566	1.4545	-1.7525	13.3613
3.8492	-2.4934	10.9402	0.4618	-1.7001	13.4918
1.6645	-2.2783	13.3337	3.5308	-2.3859	12.0352
1.4193	-1.7441	12.3128	4.263	-2.636	10.8858
1.1368	-2.0223	12.3499	5.9015	-6.2415	10.6704
1.984	-1.9124	11.1854	1.4098	-2.1521	13.3672
0.7214	-1.8233	11.3513	1.711	-1.829	12.2744
8.2966	-4.8253	12.4619	0.9317	-1.9232	12.3769
3.0652	-3.0645	13.1496	2.3285	-2.0151	11.1401
2.4019	-2.682	12.1836	0.564	-1.7483	11.372
1.8027	-2.3653	11.2092	9.1287	-7.681	11.2993
6.2547	-3.4718	12.7303	8.6888	-8.2716	10.304
4.5321	-4.178	12.9567	6.0142	-9.0131	10.6556
8.4432	-5.0819	11.3894	6.3137	-6.9342	12.7225
3.8454	-3.6296	11.9938	8.9625	-8.6141	12.3743
8.7648	-5.7711	10.294	6.2514	-8.5387	12.7307
3.1574	-3.1593	11.0311	6.2292	-7.72	11.6805
4.0318	-2.5542	13.0225	6.062	-6.888	10.6493
5.748	-5.5778	12.7969	8.6253	-8.7717	11.3655
6.5455	-3.6264	11.6389	6.0632	-9.0612	11.7023
0.775	-1.8471	13.4506	8.0604	-9.1302	10.3866
5.1581	-4.8599	11.8213	6.0484	-8.3472	10.6511
7.2012	-4.0474	10.4995	9.208	-6.8021	11.2889
4.5305	-4.236	10.8506	8.9664	-7.5209	10.2675
2.0831	-1.9342	13.2787	6.0667	-9.3358	10.6487

【００１６】

【表１－３】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
6.3713	-7.6147	12.715	7.5425	-9.8288	11.5078
6.1555	-6.7481	11.6902	7.0919	-9.7764	10.5139
9.2903	-7.8427	12.3312	6.1645	-9.5524	10.6358
6.1639	-8.3077	11.6891	6.1291	-9.7062	12.7468
6.1064	-7.5064	10.6434	6.4281	-10.2023	12.7075
8.9978	-8.0785	11.3165	6.2312	-9.8158	11.6802
8.4965	-8.5959	10.3293	6.7757	-10.3181	12.6618
6.0124	-8.8141	10.6558	6.6121	-10.2932	12.6833
9.0176	-6.66	10.2608	6.4725	-10.0203	11.6485
6.1437	-9.0753	12.7449	6.3175	-9.7208	10.6157
6.1209	-8.582	11.6947	7.3015	-10.2165	12.5927
6.2262	-6.5846	12.734	6.6328	-10.0682	11.6274
8.7531	-8.9487	12.4019	6.471	-9.8027	10.5955
6.3076	-8.2455	12.7233	6.449	-9.7946	10.5984
6.2344	-7.4063	11.6798	8.2955	-9.5074	12.462
5.9979	-6.5667	10.6577	7.054	-10.0413	11.572
9.3985	-6.9465	12.317	6.7275	-9.8427	10.5618
8.4037	-9.0674	11.3946	7.9564	-9.5269	11.4534
6.0848	-8.8329	11.6995	7.4328	-9.621	10.4691
7.8417	-9.3323	10.4153	6.2322	-9.9844	12.7332
6.0752	-8.0792	10.6475	6.0806	-9.4462	11.7
9.2039	-7.2528	11.2894	6.654	-10.303	12.6778
8.8493	-7.9128	10.2829	6.5256	-10.2605	12.6947
6.0326	-9.1877	10.6532	6.3493	-9.9419	11.6647
6.361	-7.2791	12.7163	6.9258	-10.3138	12.6421
6.0633	-6.4108	11.7023	6.5395	-10.0462	11.6397
9.1455	-8.2456	12.3503	6.5224	-10.0406	11.6419
6.1924	-8.8186	12.7385	6.3858	-9.7652	10.6067
6.203	-8.0207	11.6839	7.6508	-10.0375	12.5468
6.0967	-7.2022	10.6447	6.7441	-10.0793	11.6128
8.8261	-8.4422	11.3391	6.5385	-9.8222	10.5866
6.0612	-9.2663	11.7026	7.3593	-9.9275	11.5319
8.2812	-8.8857	10.3576	6.9505	-9.8159	10.5325
6.0253	-8.592	10.6541	6.1082	-9.5209	12.7495
9.0268	-7.1003	10.2596	6.3659	-10.1511	12.7157
8.5253	-9.2503	12.4318	6.1716	-9.7197	11.688
6.3507	-7.9375	12.7177	6.7268	-10.3142	12.6682
6.2116	-7.0812	11.6828	6.5885	-10.286	12.6864
9.3806	-7.4072	12.3194	6.4405	-10.0039	11.6527
6.1137	-9.3097	12.7488	6.2712	-9.6818	10.6218
8.1785	-9.3182	11.4242	7.1563	-10.2672	12.6118
6.097	-7.799	10.6447	6.5936	-10.0605	11.6326
6.2988	-10.0799	12.7245	6.449	-9.7946	10.5984
6.1196	-9.598	11.6949	6.4328	-9.7881	10.6005
6.6862	-10.3088	12.6736	8.0699	-9.7227	12.4917
6.5595	-10.2754	12.6902	6.9305	-10.0671	11.5883
6.3995	-9.9791	11.6581	6.6464	-9.8395	10.5725
6.219	-9.6267	10.6286	7.7428	-9.6962	11.4815
7.031	-10.2982	12.6282	6.1731	-9.8614	12.741
6.5626	-10.0529	11.6366	6.6301	-10.2978	12.6809
6.5395	-10.0462	11.6397	6.4819	-10.2374	12.7004
6.4116	-9.7785	10.6033	6.112	-9.4561	10.6427
6.2921	-9.8887	11.6722	6.841	-10.3192	12.6532
7.8536	-9.8986	12.5201	6.6301	-10.2978	12.6809
6.8272	-10.0781	11.6019	6.5	-10.0323	11.6449
6.5845	-9.8315	10.5806	6.3557	-9.7474	10.6107

【００１７】

【表１－４】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
7.4655	-10.1424	12.5711	-0.0678	-1.3762	9.3478
6.6804	-10.0747	11.6212	-0.0567	-1.356	8.2931
6.5007	-9.8122	10.5916	0.1219	-1.5408	10.377
7.2518	-9.7135	10.4929	-0.0012	-1.4832	9.339
7.1973	-9.9961	11.5532	-0.0631	-1.4373	8.294
6.8288	-9.8364	10.5485	0.1851	-1.5667	8.2613
7.6309	-9.495	10.4431	0.6917	-1.5287	10.3021
0.1152	-1.5363	9.3237	1.073	-1.6387	9.1978
-0.0044	-1.4805	8.2863	0.1066	-1.356	10.379
0.3931	-1.4408	10.3413	0.269	-1.4021	9.3035
0.6731	-1.5207	9.2504	0.5006	-1.4694	8.2199
1.0427	-1.6311	8.1486	-0.0682	-1.3769	10.402
0.0035	-1.3296	10.3925	-0.0342	-1.3375	9.3433
0.1021	-1.3531	9.3254	0.0419	-1.3343	8.2802
-0.0331	-1.3378	10.3974	-0.0379	-1.4654	10.398
0.2601	-1.3984	8.2515	-0.0718	-1.4141	9.3483
-0.0725	-1.3936	10.4025	-0.0675	-1.3752	8.2946
-0.0678	-1.3762	9.3478	-0.0626	-1.4399	9.3471
-0.0351	-1.337	8.2903	1.3505	-1.723	10.2155
0.0553	-1.5102	10.3857	1.0616	-1.9884	10.2535
-0.0398	-1.463	9.3441	1.8862	-1.8816	9.0909
-0.0715	-1.412	8.2951	0.6731	-1.7976	9.2504
0.287	-1.6155	9.3011	2.25	-2.6128	10.0972
0.1088	-1.5318	8.2714	1.6908	-2.308	9.1166
0.882	-1.5847	10.2771	3.6195	-3.4868	9.9172
0.1826	-1.3785	10.369	2.9733	-3.0429	8.948
0.3818	-1.4352	9.2887	6.2498	-3.5025	9.5714
0.6536	-1.5147	8.1998	6.8569	-3.9228	8.4375
-0.0565	-1.357	10.4004	4.1606	-2.606	9.8461
0.0014	-1.3282	9.3387	4.8742	-2.898	8.6981
0.0974	-1.3506	8.2729	2.272	-1.9974	10.0943
-0.0622	-1.4423	10.4012	0.5438	-1.7378	10.3215
-0.0719	-1.3924	9.3483	2.9104	-2.1986	8.9563
-0.0675	-1.3752	8.2946	1.5047	-2.2121	10.1952
0.2027	-1.5781	10.3664	1.3157	-1.7107	9.1659
0.0505	-1.5067	9.3322	1.0274	-1.9701	9.2038
-0.0416	-1.4604	8.2912	2.7853	-2.927	10.0269
0.2759	-1.6085	8.2494	2.1821	-2.5735	9.052
0.5306	-1.4813	10.3233	4.1489	-3.9099	9.8476
0.8588	-1.5754	9.226	3.5166	-3.4131	8.8766
0.0481	-1.3387	10.3867	5.4254	-3.1022	9.6798
0.1763	-1.3749	9.3157	6.0903	-3.4621	8.5382
0.3699	-1.4308	8.2371	3.3651	-2.3374	9.9506
-0.0682	-1.3769	10.402	4.0533	-2.5843	8.806
-0.0566	-1.3567	9.3463	1.6286	-1.8052	10.1789
-0.0008	-1.3269	8.2858	0.8691	-1.8941	10.2788
0.0021	-1.4858	10.3927	2.2139	-1.9811	9.0478
-0.0715	-1.3909	8.2951	0.5248	-1.727	9.2699
0.1937	-1.5723	9.3134	1.9933	-2.4707	10.131
0.0459	-1.5032	8.2796	1.4576	-2.1869	9.1472
0.2776	-1.4066	10.3565	3.3438	-3.2899	9.9534
0.516	-1.4746	9.271	2.7034	-2.8754	8.9835
0.8343	-1.5685	8.176	6.648	-3.7297	9.5191
0.045	-1.3364	9.3329	4.0323	-3.8213	8.8088
0.1697	-1.3718	8.2634	4.5766	-2.7576	9.7914
-0.0721	-1.416	10.4025	5.2857	-3.0724	8.644

【００１８】

【表１－５】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
2.6225	-2.104	10.0483	4.4003	-4.1376	9.8146
0.4112	-1.6752	10.339	7.5573	-4.4796	8.3454
3.2787	-2.3182	8.9079	5.456	-5.4595	9.6758
1.1016	-1.6495	10.2482	4.9369	-4.7755	8.6899
1.2735	-2.0943	10.2256	4.333	-2.7237	7.7161
1.5868	-1.7915	9.1303	2.4838	-2.0781	7.9592
0.8406	-1.8786	9.2283	0.382	-1.6577	8.2355
2.5143	-2.7645	10.0625	1.1961	-2.0513	8.1285
1.9325	-2.4366	9.0848	3.6725	-3.5426	7.8029
3.8883	-3.6932	9.8819	5.5339	-3.2373	7.5582
3.2478	-3.2238	8.9119	3.5567	-2.4382	7.8181
5.8416	-3.2941	9.6251	1.8336	-1.8726	8.0446
6.4797	-3.6821	8.4871	0.6514	-1.7848	8.2001
3.7566	-2.4664	9.8992	1.6411	-2.2794	8.07
4.4585	-2.7341	8.7528	2.8881	-2.9924	7.906
1.9358	-1.8966	10.1385	6.6736	-3.8758	7.4084
0.6965	-1.8106	10.3014	4.1586	-3.9578	7.739
2.5554	-2.0867	9.0029	4.7374	-2.8849	7.6629
0.3961	-1.6664	9.2868	2.8286	-2.1905	7.9138
1.7447	-2.3374	10.1637	1.2788	-1.7024	8.1176
1.2331	-2.0728	9.1767	0.996	-1.9519	8.1548
3.0623	-3.1016	9.9905	2.1187	-2.537	8.0072
2.4394	-2.7193	9.0182	3.4171	-3.3505	7.8365
7.033	-3.979	9.4685	5.923	-3.433	7.5071
3.7786	-3.6119	8.8421	3.939	-2.5756	7.7679
5.0033	-2.9242	9.7353	2.152	-1.9723	8.0028
5.6917	-3.2596	8.5906	0.5072	-1.7164	8.219
2.987	-2.2169	10.0003	1.4144	-2.1619	8.0998
0.2988	-1.6227	10.3537	2.6255	-2.83	7.9405
3.6598	-2.4462	8.8577	5.1381	-3.0554	7.6102
5.6877	-6.2235	8.5912	3.1864	-2.3103	7.8668
8.0606	-4.891	9.3334	3.9201	-3.7448	7.7704
8.3709	-5.5434	8.2384	1.5425	-1.7828	8.0829
4.8686	-4.6285	9.753	0.8144	-1.8632	8.1786
4.2766	-4.0418	8.7767	1.876	-2.4042	8.0391
5.7414	-6.0764	9.6383	2.3688	-2.6786	7.9743
5.2994	-5.3262	8.6422	3.1552	-3.1675	7.8709
8.7335	-6.0863	9.2449	6.3038	-3.6448	7.457
7.4004	-4.2537	9.4202	5.308	-5.4849	7.5879
7.8688	-4.8019	8.3044	4.3866	-4.1824	7.709
5.2786	-5.1696	9.6991	8.4543	-6.2407	7.1743
4.7306	-4.5186	8.717	7.3636	-4.4085	7.3177
5.5828	-5.9219	8.605	4.8036	-4.6678	7.6542
8.3376	-5.2581	9.297	5.5453	-6.0693	7.5567
8.54	-5.9594	8.2162	8.1769	-5.4287	7.2108
4.6407	-4.377	9.783	5.158	-5.2014	7.6076
7.2177	-4.1876	8.39	7.6728	-4.7167	7.277
5.6112	-5.7621	9.6554	4.6021	-4.419	7.6807
5.1271	-5.0449	8.6649	5.4384	-5.778	7.5708
7.7453	-4.5568	9.3748	8.35	-5.8305	7.188
8.1434	-5.1565	8.2683	7.0283	-4.1293	7.3618
5.0819	-4.8926	9.725	4.9894	-4.9288	7.6298
4.51	-4.2741	8.746	5.6303	-6.3567	7.5455
5.4519	-5.6188	8.6222	7.9474	-5.0566	7.241
8.5658	-5.6576	9.267	5.9651	-8.3525	9.6089
8.639	-6.3824	8.2032	6.0532	-9.1937	9.5973

【００１９】

【表１－６】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
7.5171	-9.2951	9.4048	8.0307	-8.5258	8.2832
5.9903	-7.5806	9.6055	5.9036	-8.121	8.5628
5.967	-8.7613	9.6086	7.4954	-8.7558	7.3004
6.1468	-9.3653	9.585	5.8027	-7.4338	7.5229
5.9134	-6.6994	9.6157	8.6684	-6.8011	8.1993
5.975	-8.1142	9.6076	5.995	-8.9388	8.5508
6.0144	-9.0751	9.6024	8.382	-7.4124	7.1838
7.3214	-9.4145	9.4306	5.8754	-8.4485	7.5133
5.9834	-7.2968	9.6065	6.6261	-9.3785	8.4678
5.9612	-8.5683	9.6094	6.1912	-9.2386	8.525
6.0986	-9.29	9.5913	6.0496	-8.9235	7.4904
5.8416	-6.3898	9.6251	6.3189	-9.3181	8.5082
7.7252	-9.1393	9.3775	6.1926	-9.0532	7.4716
5.9856	-7.8532	9.6062	6.1792	-9.0445	7.4734
5.9848	-8.9306	9.6063	6.3646	-9.1293	7.449
5.9593	-7.0025	9.6096	7.9406	-8.944	9.3492
6.2713	-9.491	9.5686	7.4052	-9.0986	8.3654
6.4076	-9.5639	9.5507	5.8869	-7.3716	8.565
6.7259	-9.6061	9.5089	6.9338	-9.0844	7.3742
6.3234	-9.5248	9.5618	5.6959	-6.6382	7.5369
6.488	-9.5882	9.5401	6.0858	-8.9655	7.4857
6.9847	-9.5574	9.4748	8.8029	-7.3635	9.2358
6.236	-9.4628	9.5732	8.4046	-7.9317	8.234
6.3793	-9.5525	9.5544	5.9172	-8.5175	8.561
6.3584	-9.543	9.5572	7.9015	-8.3399	7.247
6.6267	-9.6074	9.5219	5.8303	-7.9043	7.5193
6.2992	-9.5102	9.5649	6.0776	-9.1098	8.5399
6.4437	-9.5762	9.5459	8.4903	-6.648	7.1696
6.8453	-9.5911	9.4931	5.9333	-8.6985	7.5057
6.1937	-9.422	9.5788	6.2397	-9.2746	8.5186
6.3584	-9.543	9.5572	6.1163	-8.9953	7.4817
6.3432	-9.5355	9.5592	6.3955	-9.3472	8.4981
6.5478	-9.5998	9.5323	6.2366	-9.0787	7.4658
7.1426	-9.5005	9.4541	6.8802	-9.3418	8.4344
6.4382	-9.1455	7.4393	5.7679	-6.5213	8.5806
8.157	-8.7059	9.3207	6.532	-9.1546	7.427
7.6098	-8.9488	8.3385	8.3661	-8.422	9.2932
5.898	-7.636	8.5635	7.8206	-8.7589	8.3108
7.107	-9.01	7.3514	5.9019	-7.8895	8.563
5.7445	-6.9123	7.5305	7.2959	-8.9016	7.3266
8.8491	-6.9512	9.2297	5.7791	-7.1778	7.526
8.5419	-7.5832	8.216	8.8279	-6.5215	9.2325
5.9349	-8.6818	8.5587	8.6332	-7.2044	8.204
8.0923	-8.0644	7.2219	5.9613	-8.8226	8.5552
5.8416	-8.1075	7.5178	8.2552	-7.7546	7.2005
6.12	-9.1673	8.5343	5.8558	-8.2891	7.5159
5.9703	-8.7919	7.5008	6.1587	-9.2093	8.5293
6.2724	-9.2945	8.5143	6.0101	-8.8663	7.4956
6.2582	-9.2862	8.5162	6.2921	-9.3051	8.5117
6.1406	-9.0161	7.4785	6.2724	-9.2945	8.5143
6.453	-9.3623	8.4906	6.1618	-9.0323	7.4757
6.2692	-9.0947	7.4616	6.5294	-9.3744	8.4805
7.0359	-9.2913	8.4139	6.3095	-9.1114	7.4563
5.8258	-6.8131	8.573	7.2123	-9.2117	8.3907
6.6464	-9.1511	7.412	5.8642	-7.097	8.568
8.5499	-8.1029	9.2691	6.7808	-9.1294	7.3943

【００２０】

【表１－７】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
8.6992	-7.7493	9.2494	4.0441	-3.8866	6.7009
8.2313	-8.2464	8.2568	4.5954	-2.8762	6.6284
5.9076	-8.3304	8.5623	2.7438	-2.1854	6.8718
7.6995	-8.5696	7.2735	1.2405	-1.6961	7.0695
5.8187	-7.6797	7.5208	2.0582	-2.5051	6.962
6.0348	-9.0343	8.5455	3.3199	-3.299	6.7961
8.4635	-7.0415	7.1731	3.8204	-2.5706	6.7303
5.9014	-8.5852	7.5099	2.0878	-1.9661	6.9581
6.2172	-9.2589	8.5216	0.4903	-1.7068	7.1681
6.3532	-9.3326	8.5037	0.9662	-1.9352	7.1055
6.2112	-9.0646	7.4692	1.3734	-2.1392	7.052
6.1926	-9.0532	7.4716	2.5504	-2.7916	6.8973
6.7432	-9.3694	8.4524	6.8315	-4.0755	6.3345
-0.0637	-1.4345	7.2409	3.8106	-3.681	6.7316
0.1768	-1.5615	7.2093	1.4964	-1.7763	7.0358
0.4845	-1.4653	7.1688	4.8625	-4.8225	6.5933
0.0387	-1.3323	7.2274	5.502	-6.2042	6.5092
-0.0672	-1.3739	7.2414	7.746	-4.9574	6.2143
-0.0076	-1.4777	7.2335	5.1787	-5.3598	6.5517
1.0112	-1.6252	7.0996	8.2746	-6.0933	6.1448
0.2508	-1.3953	7.1996	7.1626	-4.3411	6.291
-0.0361	-1.3364	7.2373	4.6786	-4.5708	6.6175
-0.0714	-1.4097	7.2419	5.4158	-5.9257	6.5206
0.1025	-1.5276	7.219	7.9802	-5.3123	6.1835
0.6332	-1.51	7.1493	5.0297	-5.0857	6.5713
0.0927	-1.3483	7.2203	4.2677	-4.103	6.6715
-0.0672	-1.3739	7.2414	7.4701	-4.6341	6.2505
-0.0436	-1.4576	7.2382	4.4798	-4.331	6.6436
0.2651	-1.6021	7.1977	5.3087	-5.6435	6.5347
0.3575	-1.4272	7.1855	8.1609	-5.6976	6.1597
-0.0029	-1.3255	7.2329	6.2233	-8.8806	6.4144
-0.0712	-1.3892	7.2419	6.6811	-8.9085	6.3543
0.0414	-1.4998	7.2271	5.7125	-7.4876	6.4816
0.8088	-1.5632	7.1262	8.302	-6.8717	6.1412
0.163	-1.3691	7.2111	5.8238	-8.3652	6.4669
-0.0568	-1.3552	7.24	6.0093	-8.733	6.4426
4.9849	-3.043	6.5772	6.1291	-8.8322	6.4268
3.0906	-2.3056	6.8262	6.1114	-8.8206	6.4291
0.7894	-1.8492	7.1288	6.3476	-8.9172	6.3981
5.7492	-3.4091	6.4768	6.9994	-8.7952	6.3124
1.8223	-2.3753	6.993	5.6217	-6.743	6.4935
3.0651	-3.121	6.8296	7.9531	-7.8711	6.187
6.1211	-3.6127	6.4279	5.7491	-7.9028	6.4768
4.2027	-2.7175	6.6801	5.896	-8.5645	6.4575
0.3685	-1.6499	7.1841	6.0618	-8.7831	6.4357
1.161	-2.0317	7.0799	6.1846	-8.8632	6.4195
2.3011	-2.6435	6.93	6.55	-8.9274	6.3715
3.5688	-3.4854	6.7634	7.3769	-8.5476	6.2628
5.37	-3.2199	6.5266	5.6899	-7.249	6.4846
3.4496	-2.4337	6.7791	8.2283	-7.2337	6.1509
1.7789	-1.8661	6.9987	5.794	-8.2331	6.4709
0.6307	-1.7732	7.1496	5.9743	-8.6918	6.4472
1.5939	-2.2536	7.023	6.1114	-8.8206	6.4291
2.4094	-2.0724	6.9158	6.0986	-8.8117	6.4308
2.8054	-2.9502	6.8637	6.2764	-8.8996	6.4074
6.483	-3.8337	6.3803	6.8304	-8.8666	6.3346

【００２１】

【表１－８】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
5.5697	-6.4772	6.5003	-0.067	-1.3725	6.1882
7.7695	-8.1406	6.2112	-0.0572	-1.3534	5.1337
5.7311	-7.7056	6.4791	3.5862	-3.5736	4.6548
8.3202	-6.4884	6.1388	4.0659	-2.696	5.6449
5.858	-8.4745	6.4625	-0.0112	-1.475	6.1808
6.0385	-8.7624	6.4387	4.6519	-2.979	4.5147
6.1534	-8.8467	6.4236	-0.0652	-1.4285	5.1348
6.4386	-8.9283	6.3861	1.3296	-2.1227	6.0046
7.1832	-8.69	6.2882	2.332	-2.0557	5.8728
5.6607	-7.0006	6.4884	0.3537	-1.6442	6.1329
8.1088	-7.5681	6.1666	2.8866	-2.2602	4.7467
5.7695	-8.0788	6.4741	0.1588	-1.5535	5.1053
7.5746	-8.3653	6.2368	0.1557	-1.3664	6.1589
5.9357	-8.6364	6.4522	0.9775	-1.6172	6.0509
6.082	-8.7993	6.433	1.1232	-2.0178	6.0317
5.5617	-3.3762	5.4482	1.3962	-1.7512	4.9427
-0.071	-1.3873	6.1887	0.7356	-1.8307	5.0295
6.0581	-3.7184	4.3298	0.2407	-1.3921	6.1477
-0.0668	-1.371	5.135	2.2311	-2.6142	5.8861
3.6965	-2.5499	5.6934	1.0861	-2.0052	4.9834
0.0363	-1.4968	6.1746	0.4487	-1.4555	5.0672
4.2888	-2.8178	4.5624	1.7102	-2.3326	4.9014
-0.0479	-1.452	5.1325	-0.0371	-1.3359	6.1842
2.0206	-1.951	5.9137	3.463	-3.4341	5.7241
0.472	-1.7001	6.1173	0.0316	-1.3279	5.122
2.5629	-2.1432	4.7893	2.8828	-3.042	4.7472
0.7814	-1.5566	6.0766	0.23	-1.3885	5.096
1.1565	-1.6752	4.9742	5.1943	-3.1918	5.4965
0.9024	-1.913	5.0076	-0.0714	-1.4073	6.1887
2.4733	-2.7585	5.8542	5.7161	-3.5157	4.3748
0.3299	-1.4191	5.0828	-0.0668	-1.371	5.135
-0.057	-1.3543	6.1868	0.2419	-1.5927	5.0944
3.6981	-3.6243	5.6932	0.0956	-1.5241	6.1668
-0.0076	-1.3236	5.1272	3.9229	-2.6632	4.6105
3.1231	-3.2112	4.7156	-0.0147	-1.4723	5.1281
4.8218	-3.0182	5.5455	1.7214	-1.853	5.9531
-0.0645	-1.4315	6.1878	0.6082	-1.7651	6.0994
5.3666	-3.3264	4.4207	2.2505	-2.0341	4.8303
-0.0708	-1.3854	5.1355	0.3392	-1.6389	5.0816
2.9911	-2.2864	5.7862	0.6112	-1.5045	6.099
0.1677	-1.5575	6.1573	1.5439	-2.2342	5.9764
3.5669	-2.5195	4.6573	0.9419	-1.6077	5.0024
0.0314	-1.4937	5.1221	0.0876	-1.3459	6.1678
1.4477	-1.765	5.989	2.7211	-2.9131	5.8216
0.7623	-1.8395	6.0792	2.162	-2.5877	4.842
1.9497	-1.932	4.8699	6.2749	-3.7853	5.3545
0.454	-1.6938	5.0665	-0.067	-1.3725	6.1882
0.7523	-1.5488	5.0273	-0.0382	-1.3353	5.1312
0.4671	-1.4607	6.1179	3.358	-3.3881	4.6848
1.7658	-2.3529	5.9472	4.4454	-2.8534	5.595
1.2865	-2.1077	4.9571	-0.0458	-1.4548	6.1854
0.0353	-1.3301	6.1747	5.0115	-3.148	4.4674
2.9734	-3.0794	5.7885	-0.0715	-1.4048	5.1356
0.1479	-1.3634	5.1068	1.9328	-2.456	4.8721
2.3973	-2.7286	4.8111	3.807	-3.768	4.6257
5.9226	-3.5731	5.4008	2.6556	-2.1672	5.8303

【００２２】

【表１－９】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
0.2534	-1.5973	6.146	6.3487	-8.7009	5.3448
3.2214	-2.3854	4.7027	6.112	-8.4479	4.3227
0.0889	-1.5206	5.1145	5.5438	-6.8334	5.4506
1.1997	-1.6866	6.0217	6.6287	-8.4046	4.2548
0.934	-1.9236	6.0566	7.9519	-7.3617	5.134
1.6606	-1.8366	4.9079	5.6818	-7.8781	5.4324
0.5861	-1.7576	5.0491	5.5365	-7.3375	4.3984
1.995	-2.4793	5.9171	5.8604	-8.4152	5.409
0.3441	-1.4234	6.1341	6.004	-8.5726	5.3901
0.5879	-1.4981	5.0489	5.8879	-8.319	4.3522
1.4946	-2.2167	4.9297	6.1404	-8.6528	5.3722
3.3382	-2.4137	5.7405	5.5789	-7.0741	5.446
-0.0051	-1.3245	6.18	5.997	-8.3976	4.3379
3.221	-3.2528	5.7559	6.5837	-8.6807	5.3139
0.0822	-1.3433	5.1154	6.2641	-8.4748	4.3027
2.6379	-2.8796	4.7794	7.4421	-8.1404	5.2011
5.1716	-5.5218	5.4995	5.6078	-7.3053	5.4422
4.752	-4.892	4.5015	6.9506	-8.222	4.2125
5.3151	-6.187	4.4275	5.4287	-6.6763	4.4126
7.9531	-5.5511	5.1339	7.0672	-8.461	5.2503
7.9262	-6.1153	4.0842	8.1282	-6.6835	5.1109
4.3506	-4.2546	5.6074	5.7442	-8.1545	5.4242
6.6156	-4.0158	5.3097	7.7762	-7.1347	4.104
7.0099	-4.4359	4.2047	5.596	-7.6871	4.3906
4.7264	-4.7297	5.558	5.9332	-8.5081	5.3994
4.2207	-4.1866	4.5714	5.7864	-8.2035	4.3655
5.3705	-6.0631	5.4734	6.0495	-8.6049	5.3841
5.0323	-5.4109	4.4647	6.0324	-8.5934	5.3864
7.5234	-4.8493	5.1904	5.9296	-8.3533	4.3467
7.724	-5.387	4.1108	6.2605	-8.6896	5.3564
4.1434	-4.0339	5.6347	6.0624	-8.4297	4.3293
6.3901	-3.9372	4.2862	6.8907	-8.5661	5.2735
5.0406	-5.2481	5.5167	5.4993	-6.5841	5.4564
4.5886	-4.6466	4.523	6.4907	-8.4502	4.273
5.238	-5.9326	4.4376	7.804	-7.657	5.1535
8.0783	-5.9301	5.1174	5.6563	-7.7077	5.4358
6.9412	-4.2677	5.2669	7.3029	-7.9004	4.1662
7.2858	-4.7231	4.1684	5.5058	-7.1329	4.4024
4.5454	-4.4866	5.5818	7.4772	-7.6825	4.1433
4.019	-3.9722	4.5979	5.8202	-8.3462	5.4143
5.281	-5.7942	5.4851	7.9297	-6.4749	4.0838
4.9001	-5.1471	4.482	5.6655	-7.9538	4.3814
7.7629	-5.1849	5.1589	5.9844	-8.5567	5.3927
7.8582	-5.7487	4.0932	5.8595	-8.292	4.3559
3.9254	-3.8239	5.6633	6.103	-8.6355	5.3771
6.709	-4.1752	4.2443	5.9743	-8.384	4.3408
4.8918	-4.9837	5.5363	5.9576	-8.3731	4.343
4.4111	-4.4114	4.5463	6.4567	-8.6999	5.3306
5.4425	-6.3269	5.4639	6.1787	-8.4648	4.314
5.1444	-5.6733	4.4499	7.2528	-8.3198	5.2259
8.1358	-6.3114	5.1099	6.7835	-8.3296	4.2345
7.2463	-4.5443	5.2268	5.3778	-6.4353	4.4192
7.5276	-5.0398	4.1366	8.0634	-7.0358	5.1194
6.0729	-8.6192	5.381	5.7109	-8.0272	5.4286
5.9576	-8.3731	4.343	7.6402	-7.4237	4.1218
5.9455	-8.3648	4.3446	5.5658	-7.5224	4.3945

【００２３】

【表１－１０】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
5.8988	-8.4684	5.4039	3.4803	-3.5296	3.6145
5.7454	-8.1376	4.3709	4.4828	-2.9273	3.4827
6.0324	-8.5934	5.3864	-0.0657	-1.4256	4.0807
6.0201	-8.5847	5.388	2.7801	-2.2324	3.7066
5.9103	-8.3382	4.3492	0.1514	-1.5485	4.0521
6.1916	-8.6718	5.3654	1.3435	-1.7372	3.8954
6.0262	-8.4132	4.334	0.713	-1.8186	3.9783
6.7279	-8.6381	5.2949	0.43	-1.4497	4.0155
6.3684	-8.472	4.289	1.6601	-2.3108	3.8538
7.6286	-7.9202	5.1765	0.0279	-1.3257	4.0684
5.6325	-7.5167	5.4389	2.7973	-3.0094	3.7043
5.4704	-6.909	4.4071	-0.0666	-1.3695	4.0808
5.7044	-8.0548	4.3763	5.174	-3.259	3.3919
5.7808	-8.2597	5.4194	3.7792	-2.6232	3.5752
7.8762	-6.8172	4.0908	-0.0175	-1.4693	4.0743
5.6291	-7.8311	4.3862	2.167	-2.0125	3.7872
5.9618	-8.5366	5.3956	0.327	-1.6317	4.029
5.8252	-8.2543	4.3604	1.8761	-2.4324	3.8254
7.1253	-8.0796	4.1895	0.9055	-1.5976	3.953
-0.0393	-1.3348	4.0772	1.0538	-1.9893	3.9335
3.2585	-3.3486	3.6437	2.0984	-2.5623	3.7962
5.5129	-3.4386	3.3473	6.4801	-4.0607	3.2202
0.5643	-1.4911	3.9979	4.2862	-4.3431	3.5086
4.8303	-3.0891	3.4371	5.0171	-5.5621	3.4125
-0.0714	-1.4025	4.0814	7.2862	-4.879	3.1142
3.1028	-2.354	3.6642	4.6231	-4.8075	3.4643
0.0833	-1.5165	4.0611	5.1921	-6.0593	3.3895
1.4509	-2.1968	3.8813	6.7751	-4.3066	3.1814
1.5984	-1.8203	3.8619	4.0993	-4.1255	3.5331
0.5675	-1.7474	3.9974	4.9036	-5.3085	3.4274
0.0766	-1.3406	4.062	7.4823	-5.2099	3.0884
2.5598	-2.8497	3.7355	7.693	-5.9081	3.0607
5.8451	-3.6302	3.3037	4.4612	-4.5705	3.4856
-0.0666	-1.3695	4.0808	7.7063	-6.255	3.059
3.6953	-3.7191	3.5863	5.1127	-5.8129	3.3999
1.2487	-2.0898	3.9079	7.0467	-4.5782	3.1457
4.1322	-2.7724	3.5288	3.902	-3.9175	3.5591
-0.0496	-1.4491	4.0785	4.7708	-5.0537	3.4449
0.2323	-1.5868	4.0415	5.2575	-6.2999	3.3809
1.1125	-1.6632	3.9258	7.6191	-5.5561	3.0705
0.8752	-1.8991	3.957	0.0242	-1.3236	3.0157
0.3155	-1.4143	4.0306	0.0711	-1.3379	3.0095
-0.01	-1.3227	4.0733	-0.0664	-1.3679	3.0276
3.0305	-3.1754	3.6737	0.2083	-1.3804	2.9915
-0.0705	-1.3836	4.0813	-0.0411	-1.3336	1.9711
2.4681	-2.1187	3.7476	-0.0403	-1.3343	3.0242
3.4359	-2.4841	3.6204	-0.0124	-1.322	3.0205
0.0273	-1.4903	4.0684	0.0658	-1.3351	1.9571
1.8771	-1.9131	3.8253	-0.0702	-1.3816	3.0281
0.4388	-1.6851	4.0144	-0.0661	-1.3659	1.9744
0.2192	-1.3846	4.0432	0.0711	-1.3379	3.0095
0.7228	-1.5403	3.977	0.1321	-1.3568	3.0015
0.14	-1.3602	4.0536	-0.0664	-1.3679	3.0276
2.3265	-2.7011	3.7662	-0.0575	-1.3515	3.0264
6.1685	-3.8365	3.2611	-0.0144	-1.3213	1.9676
-0.0574	-1.3525	4.0796	-0.0699	-1.3793	1.9749

【００２４】

【表１－１１】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
-0.0403	-1.3343	3.0242	0.6928	-1.5315	2.9278
-0.0124	-1.322	3.0205	1.0216	-1.6397	1.8314
0.0242	-1.3236	3.0157	0.8252	-1.873	1.8572
0.1243	-1.3533	1.9494	3.3834	-3.481	2.5741
-0.0575	-1.3502	1.9733	2.2608	-2.6715	2.7217
0.0206	-1.322	1.963	3.3029	-2.446	2.5847
0.1321	-1.3568	3.0015	5.631	-3.5321	2.2786
0.2083	-1.3804	2.9915	5.9455	-3.7257	2.2373
-0.0575	-1.3515	3.0264	2.8776	-3.0782	1.5874
-0.0661	-1.3659	1.9744	3.974	-2.722	2.4965
0.1975	-1.3761	1.9397	4.3123	-2.8695	2.452
-0.0664	-1.3679	3.0276	-0.066	-1.4227	3.0275
2.9452	-3.1357	2.6317	4.7806	-3.1101	1.3373
1.4102	-2.1758	2.8335	2.6715	-2.2037	2.6677
2.4875	-2.8172	2.6919	0.1448	-1.543	2.9998
5.3086	-3.3521	2.321	3.1656	-2.4111	1.5496
5.631	-3.5321	2.2786	0.0207	-1.4823	1.963
0.4251	-1.6755	2.963	1.0676	-1.6509	2.8785
3.593	-3.6653	2.5465	1.2898	-1.723	2.8493
3.0946	-3.2421	1.5589	0.6923	-1.8053	2.9279
3.6337	-2.5795	2.5412	1.7263	-1.8775	1.7388
3.974	-2.722	2.4965	0.4112	-1.6684	1.9116
-0.0509	-1.446	3.0256	1.7766	-2.3792	1.7322
4.4596	-2.9596	1.3795	4.6479	-3.0229	2.4079
-0.0711	-1.3972	1.975	3.5101	-3.5936	1.5043
1.1797	-2.055	1.8106	0.2864	-1.404	1.9281
2.0817	-1.9908	2.7452	0.3009	-1.4092	2.9793
2.3713	-2.0937	2.7071	0.4112	-1.4436	2.9648
1.9885	-2.5013	1.7043	1.6135	-2.2879	2.8068
0.2237	-1.5802	2.9895	0.6622	-1.523	1.8787
2.8576	-2.2909	1.5901	4.6479	-3.0229	2.4079
0.8686	-1.5872	2.9047	2.7184	-2.9734	2.6615
0.8503	-1.8839	2.9071	2.2061	-2.6317	1.6757
1.4695	-1.7893	1.7725	-0.0712	-1.4	3.0282
0.5333	-1.7279	1.8956	5.3086	-3.3521	2.321
1.2137	-2.0706	2.8593	5.7153	-3.6168	1.2144
0.3009	-1.4092	2.9793	3.3058	-3.4138	1.5311
1.8233	-2.4075	2.7792	0.3922	-1.4373	1.9142
0.516	-1.4764	1.8979	3.3029	-2.446	2.5847
1.3718	-2.1566	1.7854	3.6337	-2.5795	2.5412
2.3713	-2.0937	2.7071	-0.0199	-1.4662	3.0215
2.4287	-2.7713	1.6464	-0.0662	-1.4193	1.9744
5.4102	-3.4359	1.2545	1.8029	-1.8943	2.7819
3.1671	-3.3046	2.6025	2.0817	-1.9908	2.7452
2.9821	-2.3209	2.6268	0.3161	-1.6237	2.9773
0.0238	-1.4865	3.0157	2.5595	-2.1778	1.6292
3.8106	-2.6748	1.4648	0.1385	-1.5379	1.9475
-0.0518	-1.4423	1.9725	4.9803	-3.1833	2.3642
0.2153	-1.5744	1.9374	0.0785	-1.5119	3.0086
4.1362	-2.8148	1.422	0.6928	-1.5315	2.9278
1.5349	-1.804	2.8171	0.8686	-1.5872	2.9047
1.8029	-1.8943	2.7819	1.0241	-1.9721	2.8842
2.2715	-2.0714	1.6671	1.2345	-1.7101	1.8034
1.0676	-1.6509	2.8785	0.6713	-1.796	1.8775
6.0097	-3.8148	1.1757	4.9803	-3.1833	2.3642
0.5403	-1.4837	2.9478	2.0392	-2.5352	2.7508

【００２５】

【表１－１２】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
1.5709	-2.2645	1.7592	4.8839	-5.5677	1.3237
5.9455	-3.7257	2.2373	7.2248	-5.0324	2.0691
2.6553	-2.9216	1.6166	7.3595	-5.3645	2.0514
4.3123	-2.8695	2.452	7.1953	-5.824	1.0198
5.098	-3.268	1.2955	6.2489	-3.9366	2.1974
3.7066	-3.782	1.4784	6.5434	-4.2817	1.1055
0.0739	-1.5074	1.956	4.1716	-4.2705	2.4705
2.6715	-2.2037	2.6677	4.898	-5.4496	2.375
2.9821	-2.3209	2.6268	4.5423	-4.8543	1.3686
-0.0218	-1.4624	1.9686	5.0324	-6.0269	1.3042
1.2898	-1.723	2.8493	7.4599	-6.0356	2.0382
1.5349	-1.804	2.8171	7.4358	-6.3566	2.0414
0.5505	-1.736	2.9465	6.0214	-8.0209	2.2273
1.9937	-1.9714	1.7036	5.8376	-8.1301	3.3046
0.3052	-1.6173	1.9256	6.4655	-7.628	1.1158
3.4834	-2.5389	1.5078	5.6741	-7.8509	2.273
0.4112	-1.4436	2.9648	5.5011	-7.5577	1.2426
0.5403	-1.4837	2.9478	5.8106	-7.9502	2.255
0.8308	-1.5774	1.8565	5.8268	-7.959	2.2529
0.9947	-1.9592	1.8349	5.7985	-7.9433	2.2566
6.8009	-4.4274	2.1249	5.687	-7.7098	1.2181
7.0338	-4.715	2.0942	6.284	-8.245	3.246
7.0799	-5.182	1.035	5.9587	-8.0091	2.2356
4.5042	-4.7197	2.4268	5.5958	-7.6475	1.2301
4.0731	-4.185	1.4303	6.9985	-7.838	3.152
5.0754	-5.9314	2.3517	5.3562	-6.7594	3.3679
4.7871	-5.3319	1.3364	6.5734	-7.8596	2.1548
7.3595	-5.3645	2.0514	6.4352	-7.9398	2.1729
7.4367	-5.7022	2.0413	6.1093	-7.7894	1.1626
7.1904	-6.1331	1.0205	7.6662	-6.5868	3.0643
6.2489	-3.9366	2.1974	5.5373	-7.652	3.3441
6.5363	-4.1691	2.1596	7.2761	-6.9403	2.0624
6.7669	-4.5581	1.0762	5.321	-7.0153	2.3194
3.9882	-4.0597	2.4946	6.7359	-7.3639	1.0802
4.7839	-5.2041	2.39	5.1342	-6.4616	1.2908
4.3979	-4.6228	1.3876	5.7509	-8.0524	3.316
4.9651	-5.7998	1.313	5.5358	-7.6784	2.2912
7.4358	-6.3566	2.0414	5.342	-7.3004	1.2635
7.0338	-4.715	2.0942	5.8848	-8.1624	3.2984
7.2248	-5.0324	2.0691	5.8728	-8.1547	3.3
7.1603	-5.5049	1.0244	5.7401	-7.9052	2.2643
6.2882	-4.0349	1.1391	5.877	-7.9823	2.2463
4.344	-4.4905	2.4478	6.0361	-8.2297	3.2786
3.8946	-3.9791	1.4537	5.8488	-7.9699	2.25
4.6735	-5.0936	1.3513	5.7228	-7.7294	1.2134
5.0878	-6.2479	1.2969	6.5328	-8.1713	3.2133
7.4367	-5.7022	2.0413	6.1978	-8.0175	2.2041
7.4599	-6.0356	2.0382	6.1012	-8.0256	2.2168
6.5363	-4.1691	2.1596	5.8795	-7.7861	1.1928
6.8009	-4.4274	2.1249	5.9115	-7.9953	2.2418
6.9493	-4.8634	1.0522	7.3191	-7.4388	3.1099
4.9947	-5.6925	2.3623	5.43	-7.175	3.3582
3.795	-3.858	2.52	6.8686	-7.5993	2.116
4.6511	-4.9577	2.4074	6.7196	-7.7467	2.1355
4.2412	-4.3996	1.4082	5.1971	-6.392	2.3357
5.1421	-6.165	2.3429	6.3355	-7.7096	1.1329

【００２６】

【表１－１３】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
7.3722	-6.6594	2.0497	5.7862	-8.0874	3.3114
5.6315	-7.8078	2.2786	5.5847	-7.7511	2.2847
5.6223	-7.8654	3.333	5.3943	-7.4065	1.2566
5.3972	-7.3429	2.3094	5.9013	-8.1723	3.2963
6.9815	-6.9589	1.0479	5.8848	-8.1624	3.2984
5.2129	-6.8549	1.2804	5.763	-7.9211	2.2613
7.3722	-6.6594	2.0497	5.6336	-7.6757	1.2251
7.1532	-7.1967	2.0785	6.1009	-8.2439	3.27
5.815	-8.1124	3.3076	5.9115	-7.9953	2.2418
5.4478	-7.4909	1.2496	5.877	-7.9823	2.2463
5.8001	-7.7632	1.2032	5.751	-7.7431	1.2097
5.9236	-8.1847	3.2933	5.735	-7.7355	1.2118
5.8106	-7.9502	2.255	6.6793	-8.0933	3.194
5.7825	-7.9337	2.2587	6.1978	-8.0175	2.2041
5.6638	-7.6958	1.2212	5.94	-7.7958	1.1848
6.1835	-8.251	3.2592	7.464	-7.1816	3.0908
5.9587	-8.0091	2.2356	5.4638	-7.3541	3.3538
6.3099	-7.9905	2.1894	7.0151	-7.4163	2.0967
5.7726	-7.7525	1.2069	6.8686	-7.5993	2.116
6.8361	-7.9829	3.1734	5.2434	-6.6115	2.3296
5.3113	-6.5336	3.3738	5.735	-7.7355	1.2118
6.4352	-7.9398	2.1729	5.6669	-7.9435	3.3271
6.3099	-7.9905	2.1894	5.284	-6.8226	2.3243
7.5823	-6.897	3.0753	5.4404	-7.4761	2.3037
5.4991	-7.5133	3.3491	7.0798	-6.704	1.035
7.1532	-7.1967	2.0785	5.2516	-7.0236	1.2753
6.6008	-7.5132	1.098	0.0174	-1.3204	0.9103
7.0151	-7.4163	2.0967	-0.0658	-1.3636	0.9212
5.7105	-8.0052	3.3213	0.1872	-1.3719	0.8879
5.4873	-7.588	2.2975	-0.0416	-1.3326	0.918
7.1505	-6.4277	1.0257	0.0609	-1.3325	0.9045
5.2942	-7.1725	1.2697	-0.0658	-1.3636	0.9212
5.1752	-6.6672	1.2854	-0.0696	-1.3766	0.9217
5.9523	-8.1988	3.2896	-0.0162	-1.3205	0.9147
5.8569	-8.1441	3.3021	0.117	-1.3499	0.8972
5.7106	-7.8826	2.2682	-0.0574	-1.3486	0.9201
5.5511	-7.609	1.236	0.3738	-1.431	0.8634
5.9877	-8.2137	3.2849	1.5298	-2.2409	0.7114
5.8488	-7.9699	2.25	2.5964	-2.866	0.5712
5.8268	-7.959	2.2529	3.6224	-3.7039	0.4364
5.8106	-7.9502	2.255	5.4888	-3.5113	0.191
5.7068	-7.7209	1.2155	3.3358	-2.5003	0.474
6.4012	-8.22	3.2306	-0.0235	-1.4582	0.9156
6.1012	-8.0256	2.2168	1.9072	-1.9536	0.6618
6.0214	-8.0209	2.2273	0.2943	-1.6116	0.8739
5.8338	-7.7743	1.1988	0.9656	-1.9475	0.7856
6.0167	-7.7988	1.1748	1.9405	-2.4654	0.6574
7.1614	-7.6571	3.1306	5.7743	-3.6968	0.1535
5.3952	-6.9766	3.3628	3.0267	-3.1761	0.5147
6.7196	-7.7467	2.1355	-0.0664	-1.4157	0.9213
6.5734	-7.8596	2.1548	4.2748	-2.8986	0.3506
6.2165	-7.7614	1.1485	-0.0709	-1.3941	0.9219
5.5789	-7.7694	3.3387	0.0696	-1.5027	0.9034
7.2761	-6.9403	2.0624	0.4924	-1.4693	0.8478
5.3579	-7.189	2.3145	1.3345	-2.1379	0.7371
6.8647	-7.1791	1.0633	2.3738	-2.7221	0.6005

【００２７】

【表１－１４】

X 座標	Y 座標	Z 座標	X 座標	Y 座標	Z 座標
3.4315	-3.5193	0.4614	5.6311	-7.5082	0.1723
3.6502	-2.6297	0.4327	6.8808	-6.4719	0.008
-0.0525	-1.4383	0.9194	5.1462	-6.8609	0.236
2.7352	-2.2626	0.553	5.4188	-7.3648	0.2002
2.1733	-2.0507	0.6268	5.6112	-7.4985	0.1749
0.207	-1.569	0.8853	6.1231	-7.5325	0.1076
0.9765	-1.6292	0.7842	5.7232	-7.5441	0.1602
0.8002	-1.8636	0.8073	6.0208	-7.5615	0.1211
2.8144	-3.0171	0.5426	5.1924	-7.0047	0.23
0.2724	-1.3988	0.8767	6.6025	-7.1293	0.0446
1.732	-2.3497	0.6849	5.2451	-7.1269	0.223
1.4052	-1.7758	0.7278	5.5182	-7.4443	0.1871
4.5843	-3.0396	0.3099	5.6593	-7.5207	0.1686
0.516	-1.7211	0.8447	5.6472	-7.5155	0.1702
3.0307	-2.3781	0.5141	5.8001	-7.563	0.1501
5.1931	-3.3429	0.2299	5.932	-7.5721	0.1327
4.8909	-3.1868	0.2696	6.2358	-7.4797	0.0928
1.6511	-1.8621	0.6955	6.8079	-6.7238	0.0176
0.0179	-1.4779	0.9102	5.1055	-6.6971	0.2414
0.6324	-1.5149	0.8294	5.6963	-7.5351	0.1637
1.1463	-2.0403	0.7619	5.3615	-7.3045	0.2077
2.1547	-2.5891	0.6293	5.557	-7.4689	0.182
3.2327	-3.3434	0.4876	5.5877	-7.4863	0.178
0.3973	-1.6623	0.8603	6.4818	-7.2802	0.0605
3.9633	-2.7622	0.3915	5.4717	-7.4104	0.1932
2.4493	-2.1536	0.5906	5.7559	-7.5533	0.1559
0.1324	-1.5329	0.8951	6.7131	-6.9435	0.0301
0.7938	-1.5681	0.8082	5.0668	-6.5145	0.2465
1.1803	-1.6983	0.7574			
0.6503	-1.7881	0.827			
6.2895	-4.1408	0.0858			
4.4354	-4.7515	0.3295			
4.9234	-5.891	0.2653			
6.8003	-5.0072	0.0186			
3.9779	-4.0986	0.3896			
4.8558	-5.6701	0.2742			
4.6774	-5.2156	0.2977			
5.0257	-6.3142	0.2519			
6.9416	-5.917	0			
6.5028	-4.4068	0.0577			
4.294	-4.5261	0.3481			
6.9279	-5.6206	0.0018			
6.8822	-5.3159	0.0078			
4.1413	-4.3084	0.3681			
6.0437	-3.9049	0.1181			
3.8048	-3.897	0.4124			
4.5647	-4.9842	0.3125			
4.9791	-6.1061	0.258			
6.9256	-6.2018	0.0021			
6.6756	-4.7012	0.035			
4.7742	-5.4446	0.2849			
5.3029	-7.2267	0.2154			
5.6751	-7.5271	0.1665			
5.6593	-7.5207	0.1686			
5.8585	-7.5708	0.1424			
6.3575	-7.3966	0.0768			

【００２８】

上記の表に開示した翼形部は、他の類似のタービン設計において使用するために、幾何学的に拡大又は縮小することができることも理解されたい。その結果、表１に記載した座標値は、翼形部断面形状が変化しない状態に維持されるように、率に応じて拡大又は縮小することができる。表１の座標の拡大又は縮小バージョンは、同一の定数又は数値により乗算又は除算されたＸ、Ｙ及びＺ座標値によって表されることになる。

【００２９】

図３及び図４には、半径方向最外側輪郭５２が示され、また翼形部の長手方向に沿ったその他の様々な輪郭断面が図４に示されている。また、図６には様々な輪郭が示されており、輪郭が互いに重ね合わされている。

【００３０】

現在最も実用的かつ好ましい実施形態であると考えられるものに関して本発明を説明してきたが、本発明は、開示した実施形態に限定されるものではなく、逆に、特許請求の範囲の技術思想及び技術的範囲内に含まれる様々な変更及び等価な構成を保護しようとするも

のであることを理解されたい。

【図面の簡単な説明】

【００３１】

【図１】本発明の翼形部又はベーン輪郭を採用した第２段ノズルを有するタービンの概略図。

【図２】第２段ノズルのノズルベーンの斜視図。

【図３】図２に示すノズルベーンの端面図。

【図４】図２と同様なノズルベーンの斜視図。

【図５】ベーンの長手方向に沿った様々な翼形部輪郭を示す、図４のノズルベーンの斜視図。

【図６】ベーンに沿った様々なＺ座標位置における輪郭断面を示す、図３と同様な図。

【符号の説明】

【００３２】

１０　タービン
１２　第２段ノズル
１４　第２段ベーン
１６　第１段ノズル
１８　第１段ベーン
２０　第１段バケット
２２　第１段ホイール
２４　第２段バケット
２６　第２段ホイール
２８　第３段ノズル
３０　第３段ベーン
３２　第３段バケット
３４　第３段ホイール
３８　内側バンド
４０　外側バンド
４６、４８　フック

【国際公開パンフレット】

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 January 2003 (23.01.2003)

PCT

(10) International Publication Number
WO 03/006797 A1

(51) International Patent Classification⁷: F01D 5/14

(21) International Application Number: PCT/US02/21887

(22) International Filing Date: 9 July 2002 (09.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/903,853 13 July 2001 (13.07.2001) US

(71) Applicant: GENERAL ELECTRIC COMPANY [US/US]; 1 River Road, Schenectady, NY 12345 (US).

(72) Inventors: BIELEK, Craig, Allen; 109 Summer Hill Road, Simpsonville, SC 29681 (US). VO, Thanh; 818 Palomino Court, Simpsonville, SC 29681 (US). BRUNNER, Frederick, James; 11 Hunterdon Court, Simpsonville, SC 29680 (US).

(74) Agents: MITCHELL, James, W. et al.; General Electric Company, 3135 Easton Turnpike (W3C), Fairfield, CT 06828 (US).

(81) Designated States *(national)*: CN, JP, KR.

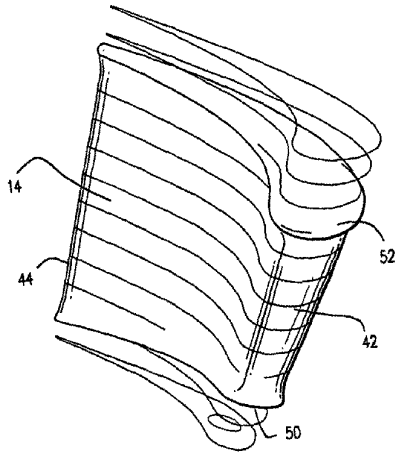
(84) Designated States *(regional)*: European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR).

Published:
with international search report
before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SECOND-STAGE TURBINE NOZZLE AIRFOIL

(57) Abstract: The second-stage nozzles (12) have vanes (14) comprising airfoil profiles substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at the radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate values. The X, Y and Z values may be scaled as a function of the same constant or number to provide a scaled-up or scaled-down airfoil section for the nozzle.



WO 03/006797 A1

SECOND-STAGE TURBINE NOZZLE AIRFOIL

BACKGROUND OF THE INVENTION

The present invention relates to a turbine nozzle for a gas turbine stage and particularly relates to a second-stage turbine nozzle airfoil profile.

In recent years, advanced gas turbines have trended toward increasing firing temperatures and efforts to improve cooling of the various turbine components. In a particular gas turbine design of the assignee, a high output turbine that uses air cooling is undergoing development. It will be appreciated that the design and construction of the turbine buckets and nozzles require optimized aerodynamic efficiency, as well as aerodynamic and mechanical loading.

BRIEF SUMMARY OF THE INVENTION

In accordance with an embodiment of the present invention, there is provided a unique turbine nozzle airfoil profile for a turbine stage, preferably the second stage, which may be defined by a unique loci of points to achieve the necessary efficiency in loading requirements whereby improved turbine performance is obtained. It will be appreciated that the nominal profile given by the X, Y, Z coordinates of Table I, which follows, define this unique loci of points. The coordinates given in inches in Table I are for a cold, i.e., room-temperature profile for each cross-section of the nozzle vane. Each defined cross-section is joined smoothly with adjacent cross-sections to form the complete airfoil shape. It will also be appreciated that as the nozzle heats up in use, the profile of the nozzle vane will change as a result of stress and temperature. Thus, the cold or room-temperature profile is given by the X, Y and Z coordinates for manufacturing purposes. Because a manufactured nozzle airfoil profile may be different than the nominal airfoil profile given in the following table, a distance of ±0.100 inches from the nominal profile in a direction normal to any surface location along the nominal profile and which includes any coating,

defines the profile envelope for this design. The design is robust to this variation without impairment of the mechanical and aerodynamic functions.

It will also be appreciated that the airfoil can be scaled-up or scaled-down geometrically for introduction into other similar turbine designs. Consequently, the X, Y and Z coordinates of the nominal airfoil profile given below are a function of the same constant or number. That is, the X, Y and Z coordinate values given in the Table may be multiplied or divided by the same constant or number to provide a scaled-up or scaled-down version of the nozzle airfoil profile, while retaining the airfoil section shape.

In a preferred embodiment according to the present invention, there is provided a turbine nozzle having a nozzle vane in the shape of an airfoil in an envelope within ±0.100 inches in a direction normal to any airfoil surface location wherein the airfoil has an uncoated nominal profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at a radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil shape.

In a further preferred embodiment according to the present invention, there is provided a turbine nozzle having a nozzle vane in the shape of an airfoil having an uncoated nominal airfoil profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at a radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate values, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil profile, the X, Y and Z values being scaled as a function of the same constant or number to provide a scaled-up or scaled-down nozzle airfoil.

In a further preferred embodiment according to the present invention, there is provided a turbine comprising a turbine nozzle having a plurality of vanes, each of said vanes being in the shape of an airfoil in an envelope within ±0.100 inches in a direction normal to any nozzle airfoil surface location wherein the airfoil has an uncoated nominal profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at a radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil shape.

In a further preferred embodiment according to the present invention, there is provided a turbine comprising a turbine nozzle having a plurality of vanes, each of said vanes being in the shape of an airfoil having an uncoated nominal airfoil profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at the radially innermost aerodynamic section of the airfoil and the profiles at the Z distances being joined smoothly with one another to form the complete airfoil shape, the X, Y and Z values being scaled as a function of the same constant or number to provide a scaled-up or scaled-down nozzle airfoil.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a schematic illustration of a turbine having a second-stage nozzle employing the airfoil or vane profile hereof;

FIGURE 2 is a perspective view of a nozzle vane thereof;

FIGURE 3 is an end view of the nozzle vane illustrated in Figure 2;

FIGURE 4 is a perspective view thereof similar to Figure 1;

FIGURE 5 is a perspective view of the nozzle vane of Figure 4 illustrating various airfoil profiles along the length of the vane; and

FIGURE 6 is a view similar to Figure 3 illustrating the profile sections at various Z coordinate locations along the vane.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to Figure 1, there is illustrated a portion of a turbine, generally designated 10, having a second-stage nozzle, generally designated 12. Nozzle 12 includes a plurality of vanes 14 having an airfoil shape or profile spaced circumferentially one from the other. The illustrated turbine 10 includes three stages, a first stage 16 having a plurality of circumferentially spaced nozzle vanes 18 and buckets 20 circumferentially spaced about a rotatable turbine wheel 22; the second stage nozzle 12 comprising a plurality of circumferentially spaced nozzle vanes 14 and a plurality of circumferentially spaced buckets 24 mounted on a second-stage wheel 26 and a third-stage 28 mounting nozzle vanes 30 and a plurality of circumferentially spaced buckets 32 mounted on a third-stage wheel 34. It will be appreciated that the nozzle vanes and buckets lie in the hot gas path of the turbine and which gases flow through the turbine in the direction of the arrow 36. As illustrated, the nozzle vanes 14 of the second stage 12 are disposed between inner and outer bands 38 and 40, respectively, by which the nozzles form an annulus about the rotor axis.

Referring to Figure 2, the nozzle vanes 14 have leading and trailing edges 42 and 44, respectively, with hooks 46 and 48 for securing the nozzle vane segments to the non-rotatable casing of the turbine. As will be appreciated, the nozzle vanes have various passages therethrough for flowing a cooling medium through the vanes. In the preferred and illustrated embodiment of the second-stage nozzle for this particular turbine, there are sixty nozzle vanes forming the second stage.

Referring now to drawing Figure 2, there is illustrated a nozzle vane 14 for the second-stage having airfoil profiles defined by a Cartesian coordinate system for X, Y and Z values. The coordinate values are set forth in inches in Table I which follows. The Cartesian coordinate system has orthogonally-related X, Y and Z axes with the X, Y and Z values commencing at a radially innermost aerodynamic section 50 of the airfoil and then made relative to that section for the Z coordinate. By defining X and Y coordinate values at selected locations in a Z direction, the profile of airfoil 14 can be ascertained. By connecting the X and Y values with smooth, continuing arcs, each profile section at each distance Z is fixed. The surface profiles at the various surface locations between the distances Z are connected smoothly to one another to form the airfoil. The tabular values given in Table I below are in inches and represent airfoil profiles at ambient, non-operating or non-hot conditions and are for an uncoated airfoil. The sign convention assigns a positive value to the value Z and positive and negative values for the X and Y coordinate values, as typically used in a Cartesian coordinate system.

The Table I values are generated and shown to four decimal places for determining the profiles of the airfoil. Where the values are carried out to less than four decimal places, zeros are added to the right to complete the value to four decimal places. Further, there are typical manufacturing tolerances as well as coatings which must be accounted for in the actual profile of the airfoil. Accordingly, the values for the profile given in Table I are for a nominal airfoil. It will therefore be appreciated that typical manufacturing tolerances, i.e., plus or minus values and coating thicknesses, are additive to the X and Y values given in Table I below. Accordingly, a distance of ±0.100 inches in a direction normal to any surface location along the airfoil profile defines an airfoil profile envelope for this particular nozzle vane design and turbine. In a preferred embodiment, the nozzle vane profiles given in Table I below are for the second stage of the turbine. Sixty nozzle vanes having such profiles are equally spaced from one another about the rotor axis and thus comprise the second stage.

The coordinate values given in Table I below in inches provide the preferred nominal profile envelope.

TABLE I

X Coordinate	Y Coordinate	Z Coordinate
0.0096	-1.334	13.5512
0.5594	-1.4939	12.4258
0.9047	-1.5942	11.3272
0.0541	-1.3432	12.4922
0.1887	-1.3822	11.4214
-0.0733	-1.4217	13.5621
-0.0691	-1.3783	12.5084
-0.0565	-1.3573	11.4536
0.1447	-1.5533	13.5335
0.0095	-1.4907	12.4981
-0.0617	-1.4447	11.4543
0.9513	-1.6079	13.4274
0.2123	-1.5838	11.4183
0.201	-1.389	13.5261
-0.0565	-1.3582	13.5599
0.2943	-1.4154	12.4607
0.5449	-1.4882	11.3745
-0.0312	-1.3386	12.5034
0.0512	-1.341	11.4394
-0.0314	-1.4726	13.5566
-0.0729	-1.4197	12.5089
-0.0686	-1.3776	11.4552
0.1367	-1.5493	12.4814
0.0056	-1.4883	11.4454
0.574	-1.4995	13.477
0.0571	-1.3455	13.545
0.7283	-1.5431	12.4036
-0.0696	-1.3791	13.5617
0.1153	-1.3617	12.4842
0.2859	-1.4112	11.4086
-0.0744	-1.3972	13.5623
-0.0691	-1.3783	12.5084
-0.0321	-1.3382	11.4504
0.0718	-1.5199	13.5431
-0.0337	-1.4702	12.5038
-0.0725	-1.4178	11.4557
0.129	-1.5452	11.4292
0.3027	-1.4195	13.5127
-0.0302	-1.3391	13.5565
0.4152	-1.4515	12.4448

X Coordinate	Y Coordinate	Z Coordinate
0.7098	-1.5368	11.3529
0.0076	-1.3325	12.4983
0.111	-1.3589	11.4316
-0.0603	-1.4496	13.5604
-0.0738	-1.396	12.509
-0.0686	-1.3776	11.4552
0.2332	-1.5941	13.5218
0.066	-1.5167	12.4907
-0.036	-1.4678	11.4509
0.7469	-1.5492	13.4543
0.1196	-1.3644	13.5368
0.9279	-1.6012	12.3774
-0.0696	-1.3791	13.5617
0.1948	-1.3856	12.4737
0.4041	-1.4465	11.393
-0.0565	-1.3578	12.5068
0.0056	-1.331	11.4454
0.0134	-1.4932	13.5507
-0.061	-1.4472	12.5074
-0.0731	-1.3947	11.4558
0.2226	-1.5889	12.4701
0.0605	-1.5135	11.4382
0.4265	-1.4564	13.4964
8.6367	-5.1815	12.4172
2.771	-2.882	13.1882
2.1294	-2.5304	12.2194
1.5553	-2.2361	11.2417
6.6906	-3.6984	12.673
4.2524	-3.9336	12.9935
8.7328	-5.467	11.3514
3.5559	-3.4153	12.0319
8.9307	-6.2124	10.2722
2.8732	-2.9772	11.0685
4.4628	-2.7098	12.9658
5.5365	-5.2716	12.8247
6.9618	-3.8661	11.5842
4.9181	-4.5906	11.8528
7.5766	-4.3299	10.4502
4.2723	-4.0002	10.8846
2.444	-2.0409	13.2312
4.7975	-2.8339	11.8687
5.9341	-6.0731	11.7193
5.5578	-3.1448	10.7156
5.4333	-5.3023	10.7319
2.7532	-2.1396	12.1374
0.4443	-1.692	12.4409

X Coordinate	Y Coordinate	Z Coordinate
3.4482	-2.3617	10.9929
9.3299	-6.4743	12.326
1.9286	-2.4132	13.299
1.1582	-1.6682	12.3471
1.3627	-2.1335	12.3202
1.6693	-1.8193	11.2267
0.8995	-1.9092	11.3279
7.9247	-4.503	12.5108
3.3645	-3.262	13.1102
2.6819	-2.8449	12.1468
2.0588	-2.503	11.1755
5.8109	-3.2613	12.7886
4.8021	-4.4333	12.9212
8.112	-4.7325	11.433
4.1275	-3.8537	11.9568
8.5338	-5.3606	10.3244
3.4463	-3.3556	10.9931
3.6139	-2.4109	13.0774
5.9368	-5.8988	12.7721
6.1189	-3.4056	11.695
5.3828	-5.1423	11.7917
6.8079	-3.7908	10.5512
4.7777	-4.4834	10.8181
1.7532	-1.8383	13.322
0.3386	-1.6428	13.508
3.9403	-2.5232	11.9814
4.689	-2.7911	10.8298
5.7718	-5.9156	10.6874
1.1765	-2.0386	13.3978
2.0333	-1.9235	12.232
0.7479	-1.8352	12.401
2.6875	-2.1237	11.0929
0.4272	-1.6839	11.39
8.9331	-5.5753	12.3782
2.4827	-2.7137	13.2261
1.8649	-2.3893	12.2542
1.1296	-1.6604	11.2977
1.3167	-2.1149	11.2731
7.1166	-3.9434	12.617
3.964	-3.6997	13.0314
8.9669	-5.8883	11.3206
3.2599	-3.2103	12.0708
2.5948	-2.808	11.1051
4.9062	-2.879	12.9075
5.3063	-4.9794	12.855
7.3648	-4.128	11.5312

X Coordinate	Y Coordinate	Z Coordinate
4.6652	-4.3336	11.8861
4.0048	-3.7753	10.9197
2.8195	-2.1555	13.1819
5.2433	-3.0118	11.8101
5.7747	-5.7486	11.7402
5.9836	-3.3421	10.6596
5.2314	-5.0161	10.7585
1.1872	-1.6757	13.3964
0.6073	-1.7681	13.4727
3.135	-2.2584	12.0872
0.3248	-1.6363	12.4566
3.8492	-2.4934	10.9402
1.6645	-2.2783	13.3337
1.4193	-1.7441	12.3128
1.1368	-2.0223	12.3499
1.984	-1.9124	11.1854
0.7214	-1.8233	11.3513
8.2966	-4.8253	12.4619
3.0652	-3.0645	13.1496
2.4019	-2.682	12.1836
1.8027	-2.3653	11.2092
6.2547	-3.4718	12.7303
4.5321	-4.178	12.9567
8.4432	-5.0819	11.3894
3.8454	-3.6296	11.9938
8.7648	-5.7711	10.294
3.1574	-3.1593	11.0311
4.0318	-2.5542	13.0225
5.748	-5.5778	12.7969
6.5455	-3.6264	11.6389
0.775	-1.8471	13.4506
5.1581	-4.8599	11.8213
7.2012	-4.0474	10.4995
4.5305	-4.236	10.8506
2.0831	-1.9342	13.2787
4.3627	-2.672	11.9258
5.1258	-2.9619	10.7724
5.6145	-5.6022	10.7081
7.929	-4.6412	10.4039
0.9647	-1.9372	13.4257
2.3859	-2.0281	12.1857
0.5854	-1.7582	12.4224
3.0609	-2.2388	11.0438
0.3113	-1.6298	11.4053
9.1701	-6.0076	12.347
2.2017	-2.5577	13.2631

X Coordinate	Y Coordinate	Z Coordinate
1.6092	-2.2572	12.2878
1.3844	-1.7355	11.2642
1.0981	-2.0062	11.3018
7.5296	-4.2103	12.5627
3.6678	-3.476	13.0704
9.13	-6.3422	11.2991
2.9681	-3.0207	12.1092
2.323	-2.6503	11.1408
5.3609	-3.0643	12.8478
5.0608	-4.7002	12.8872
7.75	-4.4157	11.4806
4.4011	-4.0881	11.9208
8.2512	-4.984	10.3615
3.729	-3.5607	10.956
3.2097	-2.2783	13.1306
6.0981	-6.2346	12.7509
5.6843	-3.2017	11.7521
5.5896	-5.4384	11.7646
6.4009	-3.5567	10.6047
5.0121	-4.7433	10.7873
1.4545	-1.7525	13.3613
0.4618	-1.7001	13.4918
3.5308	-2.3859	12.0352
4.263	-2.636	10.8858
5.9015	-6.2415	10.6704
1.4098	-2.1521	13.3672
1.711	-1.829	12.2744
0.9317	-1.9232	12.3769
2.3285	-2.0151	11.1401
0.564	-1.7483	11.372
9.1287	-7.681	11.2993
8.6888	-8.2716	10.304
6.0142	-9.0131	10.6556
6.3137	-6.9342	12.7225
8.9625	-8.6141	12.3743
6.2514	-8.5387	12.7307
6.2292	-7.72	11.6805
6.062	-6.888	10.6493
8.6253	-8.7717	11.3655
6.0632	-9.0612	11.7023
8.0604	-9.1302	10.3866
6.0484	-8.3472	10.6511
9.208	-6.8021	11.2889
8.9664	-7.5209	10.2675
6.0667	-9.3358	10.6487
6.3713	-7.6147	12.715

X Coordinate	Y Coordinate	Z Coordinate
6.1555	-6.7481	11.6902
9.2903	-7.8427	12.3312
6.1639	-8.3077	11.6891
6.1064	-7.5064	10.6434
8.9978	-8.0785	11.3165
8.4965	-8.5959	10.3293
6.0124	-8.8141	10.6558
9.0176	-6.66	10.2608
6.1437	-9.0753	12.7449
6.1209	-8.582	11.6947
6.2262	-6.5846	12.734
8.7531	-8.9487	12.4019
6.3076	-8.2455	12.7233
6.2344	-7.4063	11.6798
5.9979	-6.5667	10.6577
9.3985	-6.9465	12.317
8.4037	-9.0674	11.3946
6.0848	-8.8329	11.6995
7.8417	-9.3323	10.4153
6.0752	-8.0792	10.6475
9.2039	-7.2528	11.2894
8.8493	-7.9128	10.2829
6.0326	-9.1877	10.6532
6.361	-7.2791	12.7163
6.0633	-6.4108	11.7023
9.1455	-8.2456	12.3503
6.1924	-8.8186	12.7385
6.203	-8.0207	11.6839
6.0967	-7.2022	10.6447
8.8261	-8.4422	11.3391
6.0612	-9.2663	11.7026
8.2812	-8.8857	10.3576
6.0253	-8.592	10.6541
9.0268	-7.1003	10.2596
8.5253	-9.2503	12.4318
6.3507	-7.9375	12.7177
6.2116	-7.0812	11.6828
9.3806	-7.4072	12.3194
6.1137	-9.3097	12.7488
8.1785	-9.3182	11.4242
6.097	-7.799	10.6447
6.2988	-10.0799	12.7245
6.1196	-9.598	11.6949
6.6862	-10.3088	12.6736
6.5595	-10.2754	12.6902
6.3995	-9.9791	11.6581

X Coordinate	Y Coordinate	Z Coordinate
6.219	-9.6267	10.6286
7.031	-10.2982	12.6282
6.5626	-10.0529	11.6366
6.5395	-10.0462	11.6397
6.4116	-9.7785	10.6033
6.2921	-9.8887	11.6722
7.8536	-9.8986	12.5201
6.8272	-10.0781	11.6019
6.5845	-9.8315	10.5806
7.5425	-9.8288	11.5078
7.0919	-9.7764	10.5139
6.1645	-9.5524	10.6358
6.1291	-9.7062	12.7468
6.4281	-10.2023	12.7075
6.2312	-9.8158	11.6802
6.7757	-10.3181	12.6618
6.6121	-10.2932	12.6833
6.4725	-10.0203	11.6485
6.3175	-9.7208	10.6157
7.3015	-10.2165	12.5927
6.6328	-10.0682	11.6274
6.471	-9.8027	10.5955
6.449	-9.7946	10.5984
8.2955	-9.5074	12.462
7.054	-10.0413	11.572
6.7275	-9.8427	10.5618
7.9564	-9.5269	11.4534
7.4328	-9.621	10.4691
6.2322	-9.9844	12.7332
6.0806	-9.4462	11.7
6.654	-10.303	12.6778
6.5256	-10.2605	12.6947
6.3493	-9.9419	11.6647
6.9258	-10.3138	12.6421
6.5395	-10.0462	11.6397
6.5224	-10.0406	11.6419
6.3858	-9.7652	10.6067
7.6508	-10.0375	12.5468
6.7441	-10.0793	11.6128
6.5385	-9.8222	10.5866
7.3593	-9.9275	11.5319
6.9505	-9.8159	10.5325
6.1082	-9.5209	12.7495
6.3659	-10.1511	12.7157
6.1716	-9.7197	11.688
6.7268	-10.3142	12.6682

X Coordinate	Y Coordinate	Z Coordinate
6.5885	-10.286	12.6864
6.4405	-10.0039	11.6527
6.2712	-9.6818	10.6218
7.1563	-10.2672	12.6118
6.5936	-10.0605	11.6326
6.449	-9.7946	10.5984
6.4328	-9.7881	10.6005
8.0699	-9.7227	12.4917
6.9305	-10.0671	11.5883
6.6464	-9.8395	10.5725
7.7428	-9.6962	11.4815
6.1731	-9.8614	12.741
6.6301	-10.2978	12.6809
6.4819	-10.2374	12.7004
6.112	-9.4561	10.6427
6.841	-10.3192	12.6532
6.6301	-10.2978	12.6809
6.5	-10.0323	11.6449
6.3557	-9.7474	10.6107
7.4655	-10.1424	12.5711
6.6804	-10.0747	11.6212
6.5007	-9.8122	10.5916
7.2518	-9.7135	10.4929
7.1973	-9.9961	11.5532
6.8288	-9.8364	10.5485
7.6309	-9.495	10.4431
0.1152	-1.5363	9.3237
-0.0044	-1.4805	8.2863
0.3931	-1.4408	10.3413
0.6731	-1.5207	9.2504
1.0427	-1.6311	8.1486
0.0035	-1.3296	10.3925
0.1021	-1.3531	9.3254
-0.0331	-1.3378	10.3974
0.2601	-1.3984	8.2515
-0.0725	-1.3936	10.4025
-0.0678	-1.3762	9.3478
-0.0351	-1.337	8.2903
0.0553	-1.5102	10.3857
-0.0398	-1.463	9.3441
-0.0715	-1.412	8.2951
0.287	-1.6155	9.3011
0.1088	-1.5318	8.2714
0.882	-1.5847	10.2771
0.1826	-1.3785	10.369
0.3818	-1.4352	9.2887

X Coordinate	Y Coordinate	Z Coordinate
0.6536	-1.5147	8.1998
-0.0565	-1.357	10.4004
0.0014	-1.3282	9.3387
0.0974	-1.3506	8.2729
-0.0622	-1.4423	10.4012
-0.0719	-1.3924	9.3483
-0.0675	-1.3752	8.2946
0.2027	-1.5781	10.3664
0.0505	-1.5067	9.3322
-0.0416	-1.4604	8.2912
0.2759	-1.6085	8.2494
0.5306	-1.4813	10.3233
0.8588	-1.5754	9.226
0.0481	-1.3387	10.3867
0.1763	-1.3749	9.3157
0.3699	-1.4308	8.2371
-0.0682	-1.3769	10.402
-0.0566	-1.3567	9.3463
-0.0008	-1.3269	8.2858
0.0021	-1.4858	10.3927
-0.0715	-1.3909	8.2951
0.1937	-1.5723	9.3134
0.0459	-1.5032	8.2796
0.2776	-1.4066	10.3565
0.516	-1.4746	9.271
0.8343	-1.5685	8.176
0.045	-1.3364	9.3329
0.1697	-1.3718	8.2634
-0.0721	-1.416	10.4025
-0.0678	-1.3762	9.3478
-0.0567	-1.356	8.2931
0.1219	-1.5408	10.377
-0.0012	-1.4832	9.339
-0.0631	-1.4373	8.294
0.1851	-1.5667	8.2613
0.6917	-1.5287	10.3021
1.073	-1.6387	9.1978
0.1066	-1.356	10.379
0.269	-1.4021	9.3035
0.5006	-1.4694	8.2199
-0.0682	-1.3769	10.402
-0.0342	-1.3375	9.3433
0.0419	-1.3343	8.2802
-0.0379	-1.4654	10.398
-0.0718	-1.4141	9.3483
-0.0675	-1.3752	8.2946

X Coordinate	Y Coordinate	Z Coordinate
-0.0626	-1.4399	9.3471
1.3505	-1.723	10.2155
1.0616	-1.9884	10.2535
1.8862	-1.8816	9.0909
0.6731	-1.7976	9.2504
2.25	-2.6128	10.0972
1.6908	-2.308	9.1166
3.6195	-3.4868	9.9172
2.9733	-3.0429	8.948
6.2498	-3.5025	9.5714
6.8569	-3.9228	8.4375
4.1606	-2.606	9.8461
4.8742	-2.898	8.6981
2.272	-1.9974	10.0943
0.5438	-1.7378	10.3215
2.9104	-2.1986	8.9563
1.5047	-2.2121	10.1952
1.3157	-1.7107	9.1659
1.0274	-1.9701	9.2038
2.7853	-2.927	10.0269
2.1821	-2.5735	9.052
4.1489	-3.9099	9.8476
3.5166	-3.4131	8.8766
5.4254	-3.1022	9.6798
6.0903	-3.4621	8.5382
3.3651	-2.3374	9.9506
4.0533	-2.5843	8.806
1.6286	-1.8052	10.1789
0.8691	-1.8941	10.2788
2.2139	-1.9811	9.0478
0.5248	-1.727	9.2699
1.9933	-2.4707	10.131
1.4576	-2.1869	9.1472
3.3438	-3.2899	9.9534
2.7034	-2.8754	8.9835
6.648	-3.7297	9.5191
4.0323	-3.8213	8.8088
4.5766	-2.7576	9.7914
5.2857	-3.0724	8.644
2.6225	-2.104	10.0483
0.4112	-1.6752	10.339
3.2787	-2.3182	8.9079
1.1016	-1.6495	10.2482
1.2735	-2.0943	10.2256
1.5868	-1.7915	9.1303
0.8406	-1.8786	9.2283

X Coordinate	Y Coordinate	Z Coordinate
2.5143	-2.7645	10.0625
1.9325	-2.4366	9.0848
3.8883	-3.6932	9.8819
3.2478	-3.2238	8.9119
5.8416	-3.2941	9.6251
6.4797	-3.6821	8.4871
3.7566	-2.4664	9.8992
4.4585	-2.7341	8.7528
1.9358	-1.8966	10.1385
0.6965	-1.8106	10.3014
2.5554	-2.0867	9.0029
0.3961	-1.6664	9.2868
1.7447	-2.3374	10.1637
1.2331	-2.0728	9.1767
3.0623	-3.1016	9.9905
2.4394	-2.7193	9.0182
7.033	-3.979	9.4685
3.7786	-3.6119	8.8421
5.0033	-2.9242	9.7353
5.6917	-3.2596	8.5906
2.987	-2.2169	10.0003
0.2988	-1.6227	10.3537
3.6598	-2.4462	8.8577
5.6877	-6.2235	8.5912
8.0606	-4.891	9.3334
8.3709	-5.5434	8.2384
4.8686	-4.6285	9.753
4.2766	-4.0418	8.7767
5.7414	-6.0764	9.6383
5.2994	-5.3262	8.6422
8.7335	-6.0863	9.2449
7.4004	-4.2537	9.4202
7.8688	-4.8019	8.3044
5.2786	-5.1696	9.6991
4.7306	-4.5186	8.717
5.5828	-5.9219	8.605
8.3376	-5.2581	9.297
8.54	-5.9594	8.2162
4.6407	-4.377	9.783
7.2177	-4.1876	8.39
5.6112	-5.7621	9.6554
5.1271	-5.0449	8.6649
7.7453	-4.5568	9.3748
8.1434	-5.1565	8.2683
5.0819	-4.8926	9.725
4.51	-4.2741	8.746

X Coordinate	Y Coordinate	Z Coordinate
5.4519	-5.6188	8.6222
8.5658	-5.6576	9.267
8.639	-6.3824	8.2032
4.4003	-4.1376	9.8146
7.5573	-4.4796	8.3454
5.456	-5.4595	9.6758
4.9369	-4.7755	8.6899
4.333	-2.7237	7.7161
2.4838	-2.0781	7.9592
0.382	-1.6577	8.2355
1.1961	-2.0513	8.1285
3.6725	-3.5426	7.8029
5.5339	-3.2373	7.5582
3.5567	-2.4382	7.8181
1.8336	-1.8726	8.0446
0.6514	-1.7848	8.2001
1.6411	-2.2794	8.07
2.8881	-2.9924	7.906
6.6736	-3.8758	7.4084
4.1586	-3.9578	7.739
4.7374	-2.8849	7.6629
2.8286	-2.1905	7.9138
1.2788	-1.7024	8.1176
0.996	-1.9519	8.1548
2.1187	-2.537	8.0072
3.4171	-3.3505	7.8365
5.923	-3.433	7.5071
3.939	-2.5756	7.7679
2.152	-1.9723	8.0028
0.5072	-1.7164	8.219
1.4144	-2.1619	8.0998
2.6255	-2.83	7.9405
5.1381	-3.0554	7.6102
3.1864	-2.3103	7.8668
3.9201	-3.7448	7.7704
1.5425	-1.7828	8.0829
0.8144	-1.8632	8.1786
1.876	-2.4042	8.0391
2.3688	-2.6786	7.9743
3.1552	-3.1675	7.8709
6.3038	-3.6448	7.457
5.308	-5.4849	7.5879
4.3866	-4.1824	7.709
8.4543	-6.2407	7.1743
7.3636	-4.4085	7.3177
4.8036	-4.6678	7.6542

X Coordinate	Y Coordinate	Z Coordinate
5.5453	-6.0693	7.5567
8.1769	-5.4287	7.2108
5.158	-5.2014	7.6076
7.6728	-4.7167	7.277
4.6021	-4.419	7.6807
5.4384	-5.778	7.5708
8.35	-5.8305	7.188
7.0283	-4.1293	7.3618
4.9894	-4.9288	7.6298
5.6303	-6.3567	7.5455
7.9474	-5.0566	7.241
5.9651	-8.3525	9.6089
6.0532	-9.1937	9.5973
7.5171	-9.2951	9.4048
5.9903	-7.5806	9.6055
5.967	-8.7613	9.6086
6.1468	-9.3653	9.585
5.9134	-6.6994	9.6157
5.975	-8.1142	9.6076
6.0144	-9.0751	9.6024
7.3214	-9.4145	9.4306
5.9834	-7.2968	9.6065
5.9612	-8.5683	9.6094
6.0986	-9.29	9.5913
5.8416	-6.3898	9.6251
7.7252	-9.1393	9.3775
5.9856	-7.8532	9.6062
5.9848	-8.9306	9.6063
5.9593	-7.0025	9.6096
6.2713	-9.491	9.5686
6.4076	-9.5639	9.5507
6.7259	-9.6061	9.5089
6.3234	-9.5248	9.5618
6.488	-9.5882	9.5401
6.9847	-9.5574	9.4748
6.236	-9.4628	9.5732
6.3793	-9.5525	9.5544
6.3584	-9.543	9.5572
6.6267	-9.6074	9.5219
6.2992	-9.5102	9.5649
6.4437	-9.5762	9.5459
6.8453	-9.5911	9.4931
6.1937	-9.422	9.5788
6.3584	-9.543	9.5572
6.3432	-9.5355	9.5592
6.5478	-9.5998	9.5323

X Coordinate	Y Coordinate	Z Coordinate
7.1426	-9.5005	9.4541
6.4382	-9.1455	7.4393
8.157	-8.7059	9.3207
7.6098	-8.9488	8.3385
5.898	-7.636	8.5635
7.107	-9.01	7.3514
5.7445	-6.9123	7.5305
8.8491	-6.9512	9.2297
8.5419	-7.5832	8.216
5.9349	-8.6818	8.5587
8.0923	-8.0644	7.2219
5.8416	-8.1075	7.5178
6.12	-9.1673	8.5343
5.9703	-8.7919	7.5008
6.2724	-9.2945	8.5143
6.2582	-9.2862	8.5162
6.1406	-9.0161	7.4785
6.453	-9.3623	8.4906
6.2692	-9.0947	7.4616
7.0359	-9.2913	8.4139
5.8258	-6.8131	8.573
6.6464	-9.1511	7.412
8.5499	-8.1029	9.2691
8.0307	-8.5258	8.2832
5.9036	-8.121	8.5628
7.4954	-8.7558	7.3004
5.8027	-7.4338	7.5229
8.6684	-6.8011	8.1993
5.995	-8.9388	8.5508
8.382	-7.4124	7.1838
5.8754	-8.4485	7.5133
6.6261	-9.3785	8.4678
6.1912	-9.2386	8.525
6.0496	-8.9235	7.4904
6.3189	-9.3181	8.5082
6.1926	-9.0532	7.4716
6.1792	-9.0445	7.4734
6.3646	-9.1293	7.449
7.9406	-8.944	9.3492
7.4052	-9.0986	8.3654
5.8869	-7.3716	8.565
6.9338	-9.0844	7.3742
5.6959	-6.6382	7.5369
6.0858	-8.9655	7.4857
8.8029	-7.3635	9.2358
8.4046	-7.9317	8.234

X Coordinate	Y Coordinate	Z Coordinate
5.9172	-8.5175	8.561
7.9015	-8.3399	7.247
5.8303	-7.9043	7.5193
6.0776	-9.1098	8.5399
8.4903	-6.648	7.1696
5.9333	-8.6985	7.5057
6.2397	-9.2746	8.5186
6.1163	-8.9953	7.4817
6.3955	-9.3472	8.4981
6.2366	-9.0787	7.4658
6.8802	-9.3418	8.4344
5.7679	-6.5213	8.5806
6.532	-9.1546	7.427
8.3661	-8.422	9.2932
7.8206	-8.7589	8.3108
5.9019	-7.8895	8.563
7.2959	-8.9016	7.3266
5.7791	-7.1778	7.526
8.8279	-6.5215	9.2325
8.6332	-7.2044	8.204
5.9613	-8.8226	8.5552
8.2552	-7.7546	7.2005
5.8558	-8.2891	7.5159
6.1587	-9.2093	8.5293
6.0101	-8.8663	7.4956
6.2921	-9.3051	8.5117
6.2724	-9.2945	8.5143
6.1618	-9.0323	7.4757
6.5294	-9.3744	8.4805
6.3095	-9.1114	7.4563
7.2123	-9.2117	8.3907
5.8642	-7.097	8.568
6.7808	-9.1294	7.3943
8.6992	-7.7493	9.2494
8.2313	-8.2464	8.2568
5.9076	-8.3304	8.5623
7.6995	-8.5696	7.2735
5.8187	-7.6797	7.5208
6.0348	-9.0343	8.5455
8.4635	-7.0415	7.1731
5.9014	-8.5852	7.5099
6.2172	-9.2589	8.5216
6.3532	-9.3326	8.5037
6.2112	-9.0646	7.4692
6.1926	-9.0532	7.4716
6.7432	-9.3694	8.4524

X Coordinate	Y Coordinate	Z Coordinate
-0.0637	-1.4345	7.2409
0.1768	-1.5615	7.2093
0.4845	-1.4653	7.1688
0.0387	-1.3323	7.2274
-0.0672	-1.3739	7.2414
-0.0076	-1.4777	7.2335
1.0112	-1.6252	7.0996
0.2508	-1.3953	7.1996
-0.0361	-1.3364	7.2373
-0.0714	-1.4097	7.2419
0.1025	-1.5276	7.219
0.6332	-1.51	7.1493
0.0927	-1.3483	7.2203
-0.0672	-1.3739	7.2414
-0.0436	-1.4576	7.2382
0.2651	-1.6021	7.1977
0.3575	-1.4272	7.1855
-0.0029	-1.3255	7.2329
-0.0712	-1.3892	7.2419
0.0414	-1.4998	7.2271
0.8088	-1.5632	7.1262
0.163	-1.3691	7.2111
-0.0568	-1.3552	7.24
4.9849	-3.043	6.5772
3.0906	-2.3056	6.8262
0.7894	-1.8492	7.1288
5.7492	-3.4091	6.4768
1.8223	-2.3753	6.993
3.0651	-3.121	6.8296
6.1211	-3.6127	6.4279
4.2027	-2.7175	6.6801
0.3685	-1.6499	7.1841
1.161	-2.0317	7.0799
2.3011	-2.6435	6.93
3.5688	-3.4854	6.7634
5.37	-3.2199	6.5266
3.4496	-2.4337	6.7791
1.7789	-1.8661	6.9987
0.6307	-1.7732	7.1496
1.5939	-2.2536	7.023
2.4094	-2.0724	6.9158
2.8054	-2.9502	6.8637
6.483	-3.8337	6.3803
4.0441	-3.8866	6.7009
4.5954	-2.8762	6.6284
2.7438	-2.1854	6.8718

X Coordinate	Y Coordinate	Z Coordinate
1.2405	-1.6961	7.0695
2.0582	-2.5051	6.962
3.3199	-3.299	6.7961
3.8204	-2.5706	6.7303
2.0878	-1.9661	6.9581
0.4903	-1.7068	7.1681
0.9662	-1.9352	7.1055
1.3734	-2.1392	7.052
2.5504	-2.7916	6.8973
6.8315	-4.0755	6.3345
3.8106	-3.681	6.7316
1.4964	-1.7763	7.0358
4.8625	-4.8225	6.5933
5.502	-6.2042	6.5092
7.746	-4.9574	6.2143
5.1787	-5.3598	6.5517
8.2746	-6.0933	6.1448
7.1626	-4.3411	6.291
4.6786	-4.5708	6.6175
5.4158	-5.9257	6.5206
7.9802	-5.3123	6.1835
5.0297	-5.0857	6.5713
4.2677	-4.103	6.6715
7.4701	-4.6341	6.2505
4.4798	-4.331	6.6436
5.3087	-5.6435	6.5347
8.1609	-5.6976	6.1597
6.2233	-8.8806	6.4144
6.6811	-8.9085	6.3543
5.7125	-7.4876	6.4816
8.302	-6.8717	6.1412
5.8238	-8.3652	6.4669
6.0093	-8.733	6.4426
6.1291	-8.8322	6.4268
6.1114	-8.8206	6.4291
6.3476	-8.9172	6.3981
6.9994	-8.7952	6.3124
5.6217	-6.743	6.4935
7.9531	-7.8711	6.187
5.7491	-7.9028	6.4768
5.896	-8.5645	6.4575
6.0618	-8.7831	6.4357
6.1846	-8.8632	6.4195
6.55	-8.9274	6.3715
7.3769	-8.5476	6.2628
5.6899	-7.249	6.4846

X Coordinate	Y Coordinate	Z Coordinate
8.2283	-7.2337	6.1509
5.794	-8.2331	6.4709
5.9743	-8.6918	6.4472
6.1114	-8.8206	6.4291
6.0986	-8.8117	6.4308
6.2764	-8.8996	6.4074
6.8304	-8.8666	6.3346
5.5697	-6.4772	6.5003
7.7695	-8.1406	6.2112
5.7311	-7.7056	6.4791
8.3202	-6.4884	6.1388
5.858	-8.4745	6.4625
6.0385	-8.7624	6.4387
6.1534	-8.8467	6.4236
6.4386	-8.9283	6.3861
7.1832	-8.69	6.2882
5.6607	-7.0006	6.4884
8.1088	-7.5681	6.1666
5.7695	-8.0788	6.4741
7.5746	-8.3653	6.2368
5.9357	-8.6364	6.4522
6.082	-8.7993	6.433
5.5617	-3.3762	5.4482
-0.071	-1.3873	6.1887
6.0581	-3.7184	4.3298
-0.0668	-1.371	5.135
3.6965	-2.5499	5.6934
0.0363	-1.4968	6.1746
4.2888	-2.8178	4.5624
-0.0479	-1.452	5.1325
2.0206	-1.951	5.9137
0.472	-1.7001	6.1173
2.5629	-2.1432	4.7893
0.7814	-1.5566	6.0766
1.1565	-1.6752	4.9742
0.9024	-1.913	5.0076
2.4733	-2.7585	5.8542
0.3299	-1.4191	5.0828
-0.057	-1.3543	6.1868
3.6981	-3.6243	5.6932
-0.0076	-1.3236	5.1272
3.1231	-3.2112	4.7156
4.8218	-3.0182	5.5455
-0.0645	-1.4315	6.1878
5.3666	-3.3264	4.4207
-0.0708	-1.3854	5.1355

X Coordinate	Y Coordinate	Z Coordinate
2.9911	-2.2864	5.7862
0.1677	-1.5575	6.1573
3.5669	-2.5195	4.6573
0.0314	-1.4937	5.1221
1.4477	-1.765	5.989
0.7623	-1.8395	6.0792
1.9497	-1.932	4.8699
0.454	-1.6938	5.0665
0.7523	-1.5488	5.0273
0.4671	-1.4607	6.1179
1.7658	-2.3529	5.9472
1.2865	-2.1077	4.9571
0.0353	-1.3301	6.1747
2.9734	-3.0794	5.7885
0.1479	-1.3634	5.1068
2.3973	-2.7286	4.8111
5.9226	-3.5731	5.4008
-0.067	-1.3725	6.1882
-0.0572	-1.3534	5.1337
3.5862	-3.5736	4.6548
4.0659	-2.696	5.6449
-0.0112	-1.475	6.1808
4.6519	-2.979	4.5147
-0.0652	-1.4285	5.1348
1.3296	-2.1227	6.0046
2.332	-2.0557	5.8728
0.3537	-1.6442	6.1329
2.8866	-2.2602	4.7467
0.1588	-1.5535	5.1053
0.1557	-1.3664	6.1589
0.9775	-1.6172	6.0509
1.1232	-2.0178	6.0317
1.3962	-1.7512	4.9427
0.7356	-1.8307	5.0295
0.2407	-1.3921	6.1477
2.2311	-2.6142	5.8861
1.0861	-2.0052	4.9834
0.4487	-1.4555	5.0672
1.7102	-2.3326	4.9014
-0.0371	-1.3359	6.1842
3.463	-3.4341	5.7241
0.0316	-1.3279	5.122
2.8828	-3.042	4.7472
0.23	-1.3885	5.096
5.1943	-3.1918	5.4965
-0.0714	-1.4073	6.1887

X Coordinate	Y Coordinate	Z Coordinate
5.7161	-3.5157	4.3748
-0.0668	-1.371	5.135
0.2419	-1.5927	5.0944
0.0956	-1.5241	6.1668
3.9229	-2.6632	4.6105
-0.0147	-1.4723	5.1281
1.7214	-1.853	5.9531
0.6082	-1.7651	6.0994
2.2505	-2.0341	4.8303
0.3392	-1.6389	5.0816
0.6112	-1.5045	6.099
1.5439	-2.2342	5.9764
0.9419	-1.6077	5.0024
0.0876	-1.3459	6.1678
2.7211	-2.9131	5.8216
2.162	-2.5877	4.842
6.2749	-3.7853	5.3545
-0.067	-1.3725	6.1882
-0.0382	-1.3353	5.1312
3.358	-3.3881	4.6848
4.4454	-2.8534	5.595
-0.0458	-1.4548	6.1854
5.0115	-3.148	4.4674
-0.0715	-1.4048	5.1356
1.9328	-2.456	4.8721
3.807	-3.768	4.6257
2.6556	-2.1672	5.8303
0.2534	-1.5973	6.146
3.2214	-2.3854	4.7027
0.0889	-1.5206	5.1145
1.1997	-1.6866	6.0217
0.934	-1.9236	6.0566
1.6606	-1.8366	4.9079
0.5861	-1.7576	5.0491
1.995	-2.4793	5.9171
0.3441	-1.4234	6.1341
0.5879	-1.4981	5.0489
1.4946	-2.2167	4.9297
3.3382	-2.4137	5.7405
-0.0051	-1.3245	6.18
3.221	-3.2528	5.7559
0.0822	-1.3433	5.1154
2.6379	-2.8796	4.7794
5.1716	-5.5218	5.4995
4.752	-4.892	4.5015
5.3151	-6.187	4.4275

X Coordinate	Y Coordinate	Z Coordinate
7.9531	-5.5511	5.1339
7.9262	-6.1153	4.0842
4.3506	-4.2546	5.6074
6.6156	-4.0158	5.3097
7.0099	-4.4359	4.2047
4.7264	-4.7297	5.558
4.2207	-4.1866	4.5714
5.3705	-6.0631	5.4734
5.0323	-5.4109	4.4647
7.5234	-4.8493	5.1904
7.724	-5.387	4.1108
4.1434	-4.0339	5.6347
6.3901	-3.9372	4.2862
5.0406	-5.2481	5.5167
4.5886	-4.6466	4.523
5.238	-5.9326	4.4376
8.0783	-5.9301	5.1174
6.9412	-4.2677	5.2669
7.2858	-4.7231	4.1684
4.5454	-4.4866	5.5818
4.019	-3.9722	4.5979
5.281	-5.7942	5.4851
4.9001	-5.1471	4.482
7.7629	-5.1849	5.1589
7.8582	-5.7487	4.0932
3.9254	-3.8239	5.6633
6.709	-4.1752	4.2443
4.8918	-4.9837	5.5363
4.4111	-4.4114	4.5463
5.4425	-6.3269	5.4639
5.1444	-5.6733	4.4499
8.1358	-6.3114	5.1099
7.2463	-4.5443	5.2268
7.5276	-5.0398	4.1366
6.0729	-8.6192	5.381
5.9576	-8.3731	4.343
5.9455	-8.3648	4.3446
6.3487	-8.7009	5.3448
6.112	-8.4479	4.3227
5.5438	-6.8334	5.4506
6.6287	-8.4046	4.2548
7.9519	-7.3617	5.134
5.6818	-7.8781	5.4324
5.5365	-7.3375	4.3984
5.8604	-8.4152	5.409
6.004	-8.5726	5.3901

X Coordinate	Y Coordinate	Z Coordinate
5.8879	-8.319	4.3522
6.1404	-8.6528	5.3722
5.5789	-7.0741	5.446
5.997	-8.3976	4.3379
6.5837	-8.6807	5.3139
6.2641	-8.4748	4.3027
7.4421	-8.1404	5.2011
5.6078	-7.3053	5.4422
6.9506	-8.222	4.2125
5.4287	-6.6763	4.4126
7.0672	-8.461	5.2503
8.1282	-6.6835	5.1109
5.7442	-8.1545	5.4242
7.7762	-7.1347	4.104
5.596	-7.6871	4.3906
5.9332	-8.5081	5.3994
5.7864	-8.2035	4.3655
6.0495	-8.6049	5.3841
6.0324	-8.5934	5.3864
5.9296	-8.3533	4.3467
6.2605	-8.6896	5.3564
6.0624	-8.4297	4.3293
6.8907	-8.5661	5.2735
5.4993	-6.5841	5.4564
6.4907	-8.4502	4.273
7.804	-7.657	5.1535
5.6563	-7.7077	5.4358
7.3029	-7.9004	4.1662
5.5058	-7.1329	4.4024
7.4772	-7.6825	4.1433
5.8202	-8.3462	5.4143
7.9297	-6.4749	4.0838
5.6655	-7.9538	4.3814
5.9844	-8.5567	5.3927
5.8595	-8.292	4.3559
6.103	-8.6355	5.3771
5.9743	-8.384	4.3408
5.9576	-8.3731	4.343
6.4567	-8.6999	5.3306
6.1787	-8.4648	4.314
7.2528	-8.3198	5.2259
6.7835	-8.3296	4.2345
5.3778	-6.4353	4.4192
8.0634	-7.0358	5.1194
5.7109	-8.0272	5.4286
7.6402	-7.4237	4.1218

X Coordinate	Y Coordinate	Z Coordinate
5.5658	-7.5224	4.3945
5.8988	-8.4684	5.4039
5.7454	-8.1376	4.3709
6.0324	-8.5934	5.3864
6.0201	-8.5847	5.388
5.9103	-8.3382	4.3492
6.1916	-8.6718	5.3654
6.0262	-8.4132	4.334
6.7279	-8.6381	5.2949
6.3684	-8.472	4.289
7.6286	-7.9202	5.1765
5.6325	-7.5167	5.4389
5.4704	-6.909	4.4071
5.7044	-8.0548	4.3763
5.7808	-8.2597	5.4194
7.8762	-6.8172	4.0908
5.6291	-7.8311	4.3862
5.9618	-8.5366	5.3956
5.8252	-8.2543	4.3604
7.1253	-8.0796	4.1895
-0.0393	-1.3348	4.0772
3.2585	-3.3486	3.6437
5.5129	-3.4386	3.3473
0.5643	-1.4911	3.9979
4.8303	-3.0891	3.4371
-0.0714	-1.4025	4.0814
3.1028	-2.354	3.6642
0.0833	-1.5165	4.0611
1.4509	-2.1968	3.8813
1.5984	-1.8203	3.8619
0.5675	-1.7474	3.9974
0.0766	-1.3406	4.062
2.5598	-2.8497	3.7355
5.8451	-3.6302	3.3037
-0.0666	-1.3695	4.0808
3.6953	-3.7191	3.5863
1.2487	-2.0898	3.9079
4.1322	-2.7724	3.5288
-0.0496	-1.4491	4.0785
0.2323	-1.5868	4.0415
1.1125	-1.6632	3.9258
0.8752	-1.8991	3.957
0.3155	-1.4143	4.0306
-0.01	-1.3227	4.0733
3.0305	-3.1754	3.6737
-0.0705	-1.3836	4.0813

X Coordinate	Y Coordinate	Z Coordinate
2.4681	-2.1187	3.7476
3.4359	-2.4841	3.6204
0.0273	-1.4903	4.0684
1.8771	-1.9131	3.8253
0.4388	-1.6851	4.0144
0.2192	-1.3846	4.0432
0.7228	-1.5403	3.977
0.14	-1.3602	4.0536
2.3265	-2.7011	3.7662
6.1685	-3.8365	3.2611
-0.0574	-1.3525	4.0796
3.4803	-3.5296	3.6145
4.4828	-2.9273	3.4827
-0.0657	-1.4256	4.0807
2.7801	-2.2324	3.7066
0.1514	-1.5485	4.0521
1.3435	-1.7372	3.8954
0.713	-1.8186	3.9783
0.43	-1.4497	4.0155
1.6601	-2.3108	3.8538
0.0279	-1.3257	4.0684
2.7973	-3.0094	3.7043
-0.0666	-1.3695	4.0808
5.174	-3.259	3.3919
3.7792	-2.6232	3.5752
-0.0175	-1.4693	4.0743
2.167	-2.0125	3.7872
0.327	-1.6317	4.029
1.8761	-2.4324	3.8254
0.9055	-1.5976	3.953
1.0538	-1.9893	3.9335
2.0984	-2.5623	3.7962
6.4801	-4.0607	3.2202
4.2862	-4.3431	3.5086
5.0171	-5.5621	3.4125
7.2862	-4.879	3.1142
4.6231	-4.8075	3.4643
5.1921	-6.0593	3.3895
6.7751	-4.3066	3.1814
4.0993	-4.1255	3.5331
4.9036	-5.3085	3.4274
7.4823	-5.2099	3.0884
7.693	-5.9081	3.0607
4.4612	-4.5705	3.4856
7.7063	-6.255	3.059
5.1127	-5.8129	3.3999

X Coordinate	Y Coordinate	Z Coordinate
7.0467	-4.5782	3.1457
3.902	-3.9175	3.5591
4.7708	-5.0537	3.4449
5.2575	-6.2999	3.3809
7.6191	-5.5561	3.0705
0.0242	-1.3236	3.0157
0.0711	-1.3379	3.0095
-0.0664	-1.3679	3.0276
0.2083	-1.3804	2.9915
-0.0411	-1.3336	1.9711
-0.0403	-1.3343	3.0242
-0.0124	-1.322	3.0205
0.0658	-1.3351	1.9571
-0.0702	-1.3816	3.0281
-0.0661	-1.3659	1.9744
0.0711	-1.3379	3.0095
0.1321	-1.3568	3.0015
-0.0664	-1.3679	3.0276
-0.0575	-1.3515	3.0264
-0.0144	-1.3213	1.9676
-0.0699	-1.3793	1.9749
-0.0403	-1.3343	3.0242
-0.0124	-1.322	3.0205
0.0242	-1.3236	3.0157
0.1243	-1.3533	1.9494
-0.0575	-1.3502	1.9733
0.0206	-1.322	1.963
0.1321	-1.3568	3.0015
0.2083	-1.3804	2.9915
-0.0575	-1.3515	3.0264
-0.0661	-1.3659	1.9744
0.1975	-1.3761	1.9397
-0.0664	-1.3679	3.0276
2.9452	-3.1357	2.6317
1.4102	-2.1758	2.8335
2.4875	-2.8172	2.6919
5.3086	-3.3521	2.321
5.631	-3.5321	2.2786
0.4251	-1.6755	2.963
3.593	-3.6653	2.5465
3.0946	-3.2421	1.5589
3.6337	-2.5795	2.5412
3.974	-2.722	2.4965
-0.0509	-1.446	3.0256
4.4596	-2.9596	1.3795
-0.0711	-1.3972	1.975

X Coordinate	Y Coordinate	Z Coordinate
1.1797	-2.055	1.8106
2.0817	-1.9908	2.7452
2.3713	-2.0937	2.7071
1.9885	-2.5013	1.7043
0.2237	-1.5802	2.9895
2.8576	-2.2909	1.5901
0.8686	-1.5872	2.9047
0.8503	-1.8839	2.9071
1.4695	-1.7893	1.7725
0.5333	-1.7279	1.8956
1.2137	-2.0706	2.8593
0.3009	-1.4092	2.9793
1.8233	-2.4075	2.7792
0.516	-1.4764	1.8979
1.3718	-2.1566	1.7854
2.3713	-2.0937	2.7071
2.4287	-2.7713	1.6464
5.4102	-3.4359	1.2545
3.1671	-3.3046	2.6025
2.9821	-2.3209	2.6268
0.0238	-1.4865	3.0157
3.8106	-2.6748	1.4648
-0.0518	-1.4423	1.9725
0.2153	-1.5744	1.9374
4.1362	-2.8148	1.422
1.5349	-1.804	2.8171
1.8029	-1.8943	2.7819
2.2715	-2.0714	1.6671
1.0676	-1.6509	2.8785
6.0097	-3.8148	1.1757
0.5403	-1.4837	2.9478
0.6928	-1.5315	2.9278
1.0216	-1.6397	1.8314
0.8252	-1.873	1.8572
3.3834	-3.481	2.5741
2.2608	-2.6715	2.7217
3.3029	-2.446	2.5847
5.631	-3.5321	2.2786
5.9455	-3.7257	2.2373
2.8776	-3.0782	1.5874
3.974	-2.722	2.4965
4.3123	-2.8695	2.452
-0.066	-1.4227	3.0275
4.7806	-3.1101	1.3373
2.6715	-2.2037	2.6677
0.1448	-1.543	2.9998

X Coordinate	Y Coordinate	Z Coordinate
3.1656	-2.4111	1.5496
0.0207	-1.4823	1.963
1.0676	-1.6509	2.8785
1.2898	-1.723	2.8493
0.6923	-1.8053	2.9279
1.7263	-1.8775	1.7388
0.4112	-1.6684	1.9116
1.7766	-2.3792	1.7322
4.6479	-3.0229	2.4079
3.5101	-3.5936	1.5043
0.2864	-1.404	1.9281
0.3009	-1.4092	2.9793
0.4112	-1.4436	2.9648
1.6135	-2.2879	2.8068
0.6622	-1.523	1.8787
4.6479	-3.0229	2.4079
2.7184	-2.9734	2.6615
2.2061	-2.6317	1.6757
-0.0712	-1.4	3.0282
5.3086	-3.3521	2.321
5.7153	-3.6168	1.2144
3.3058	-3.4138	1.5311
0.3922	-1.4373	1.9142
3.3029	-2.446	2.5847
3.6337	-2.5795	2.5412
-0.0199	-1.4662	3.0215
-0.0662	-1.4193	1.9744
1.8029	-1.8943	2.7819
2.0817	-1.9908	2.7452
0.3161	-1.6237	2.9773
2.5595	-2.1778	1.6292
0.1385	-1.5379	1.9475
4.9803	-3.1833	2.3642
0.0785	-1.5119	3.0086
0.6928	-1.5315	2.9278
0.8686	-1.5872	2.9047
1.0241	-1.9721	2.8842
1.2345	-1.7101	1.8034
0.6713	-1.796	1.8775
4.9803	-3.1833	2.3642
2.0392	-2.5352	2.7508
1.5709	-2.2645	1.7592
5.9455	-3.7257	2.2373
2.6553	-2.9216	1.6166
4.3123	-2.8695	2.452
5.098	-3.268	1.2955

X Coordinate	Y Coordinate	Z Coordinate
3.7066	-3.782	1.4784
0.0739	-1.5074	1.956
2.6715	-2.2037	2.6677
2.9821	-2.3209	2.6268
-0.0218	-1.4624	1.9686
1.2898	-1.723	2.8493
1.5349	-1.804	2.8171
0.5505	-1.736	2.9465
1.9937	-1.9714	1.7036
0.3052	-1.6173	1.9256
3.4834	-2.5389	1.5078
0.4112	-1.4436	2.9648
0.5403	-1.4837	2.9478
0.8308	-1.5774	1.8565
0.9947	-1.9592	1.8349
6.8009	-4.4274	2.1249
7.0338	-4.715	2.0942
7.0799	-5.182	1.035
4.5042	-4.7197	2.4268
4.0731	-4.185	1.4303
5.0754	-5.9314	2.3517
4.7871	-5.3319	1.3364
7.3595	-5.3645	2.0514
7.4367	-5.7022	2.0413
7.1904	-6.1331	1.0205
6.2489	-3.9366	2.1974
6.5363	-4.1691	2.1596
6.7669	-4.5581	1.0762
3.9882	-4.0597	2.4946
4.7839	-5.2041	2.39
4.3979	-4.6228	1.3876
4.9651	-5.7998	1.313
7.4358	-6.3566	2.0414
7.0338	-4.715	2.0942
7.2248	-5.0324	2.0691
7.1603	-5.5049	1.0244
6.2882	-4.0349	1.1391
4.344	-4.4905	2.4478
3.8946	-3.9791	1.4537
4.6735	-5.0936	1.3513
5.0878	-6.2479	1.2969
7.4367	-5.7022	2.0413
7.4599	-6.0356	2.0382
6.5363	-4.1691	2.1596
6.8009	-4.4274	2.1249
6.9493	-4.8634	1.0522

X Coordinate	Y Coordinate	Z Coordinate
4.9947	-5.6925	2.3623
3.795	-3.858	2.52
4.6511	-4.9577	2.4074
4.2412	-4.3996	1.4082
5.1421	-6.165	2.3429
4.8839	-5.5677	1.3237
7.2248	-5.0324	2.0691
7.3595	-5.3645	2.0514
7.1953	-5.824	1.0198
6.2489	-3.9366	2.1974
6.5434	-4.2817	1.1055
4.1716	-4.2705	2.4705
4.898	-5.4496	2.375
4.5423	-4.8543	1.3686
5.0324	-6.0269	1.3042
7.4599	-6.0356	2.0382
7.4358	-6.3566	2.0414
6.0214	-8.0209	2.2273
5.8376	-8.1301	3.3046
6.4655	-7.628	1.1158
5.6741	-7.8509	2.273
5.5011	-7.5577	1.2426
5.8106	-7.9502	2.255
5.8268	-7.959	2.2529
5.7985	-7.9433	2.2566
5.687	-7.7098	1.2181
6.284	-8.245	3.246
5.9587	-8.0091	2.2356
5.5958	-7.6475	1.2301
6.9985	-7.838	3.152
5.3562	-6.7594	3.3679
6.5734	-7.8596	2.1548
6.4352	-7.9398	2.1729
6.1093	-7.7894	1.1626
7.6662	-6.5868	3.0643
5.5373	-7.652	3.3441
7.2761	-6.9403	2.0624
5.321	-7.0153	2.3194
6.7359	-7.3639	1.0802
5.1342	-6.4616	1.2908
5.7509	-8.0524	3.316
5.5358	-7.6784	2.2912
5.342	-7.3004	1.2635
5.8848	-8.1624	3.2984
5.8728	-8.1547	3.3
5.7401	-7.9052	2.2643

X Coordinate	Y Coordinate	Z Coordinate
5.877	-7.9823	2.2463
6.0361	-8.2297	3.2786
5.8488	-7.9699	2.25
5.7228	-7.7294	1.2134
6.5328	-8.1713	3.2133
6.1978	-8.0175	2.2041
6.1012	-8.0256	2.2168
5.8795	-7.7861	1.1928
5.9115	-7.9953	2.2418
7.3191	-7.4388	3.1099
5.43	-7.175	3.3582
6.8686	-7.5993	2.116
6.7196	-7.7467	2.1355
5.1971	-6.392	2.3357
6.3355	-7.7096	1.1329
7.3722	-6.6594	2.0497
5.6315	-7.8078	2.2786
5.6223	-7.8654	3.333
5.3972	-7.3429	2.3094
6.9815	-6.9589	1.0479
5.2129	-6.8549	1.2804
7.3722	-6.6594	2.0497
7.1532	-7.1967	2.0785
5.815	-8.1124	3.3076
5.4478	-7.4909	1.2496
5.8001	-7.7632	1.2032
5.9236	-8.1847	3.2933
5.8106	-7.9502	2.255
5.7825	-7.9337	2.2587
5.6638	-7.6958	1.2212
6.1835	-8.251	3.2592
5.9587	-8.0091	2.2356
6.3099	-7.9905	2.1894
5.7726	-7.7525	1.2069
6.8361	-7.9829	3.1734
5.3113	-6.5336	3.3738
6.4352	-7.9398	2.1729
6.3099	-7.9905	2.1894
7.5823	-6.897	3.0753
5.4991	-7.5133	3.3491
7.1532	-7.1967	2.0785
6.6008	-7.5132	1.098
7.0151	-7.4163	2.0967
5.7105	-8.0052	3.3213
5.4873	-7.588	2.2975
7.1505	-6.4277	1.0257

X Coordinate	Y Coordinate	Z Coordinate
5.2942	-7.1725	1.2697
5.1752	-6.6672	1.2854
5.9523	-8.1988	3.2896
5.8569	-8.1441	3.3021
5.7106	-7.8826	2.2682
5.5511	-7.609	1.236
5.9877	-8.2137	3.2849
5.8488	-7.9699	2.25
5.8268	-7.959	2.2529
5.8106	-7.9502	2.255
5.7068	-7.7209	1.2155
6.4012	-8.22	3.2306
6.1012	-8.0256	2.2168
6.0214	-8.0209	2.2273
5.8338	-7.7743	1.1988
6.0167	-7.7988	1.1748
7.1614	-7.6571	3.1306
5.3952	-6.9766	3.3628
6.7196	-7.7467	2.1355
6.5734	-7.8596	2.1548
6.2165	-7.7614	1.1485
5.5789	-7.7694	3.3387
7.2761	-6.9403	2.0624
5.3579	-7.189	2.3145
6.8647	-7.1791	1.0633
5.7862	-8.0874	3.3114
5.5847	-7.7511	2.2847
5.3943	-7.4065	1.2566
5.9013	-8.1723	3.2963
5.8848	-8.1624	3.2984
5.763	-7.9211	2.2613
5.6336	-7.6757	1.2251
6.1009	-8.2439	3.27
5.9115	-7.9953	2.2418
5.877	-7.9823	2.2463
5.751	-7.7431	1.2097
5.735	-7.7355	1.2118
6.6793	-8.0933	3.194
6.1978	-8.0175	2.2041
5.94	-7.7958	1.1848
7.464	-7.1816	3.0908
5.4638	-7.3541	3.3538
7.0151	-7.4163	2.0967
6.8686	-7.5993	2.116
5.2434	-6.6115	2.3296
5.735	-7.7355	1.2118

X Coordinate	Y Coordinate	Z Coordinate
5.6669	-7.9435	3.3271
5.284	-6.8226	2.3243
5.4404	-7.4761	2.3037
7.0798	-6.704	1.035
5.2516	-7.0236	1.2753
0.0174	-1.3204	0.9103
-0.0658	-1.3636	0.9212
0.1872	-1.3719	0.8879
-0.0416	-1.3326	0.918
0.0609	-1.3325	0.9045
-0.0658	-1.3636	0.9212
-0.0696	-1.3766	0.9217
-0.0162	-1.3205	0.9147
0.117	-1.3499	0.8972
-0.0574	-1.3486	0.9201
0.3738	-1.431	0.8634
1.5298	-2.2409	0.7114
2.5964	-2.866	0.5712
3.6224	-3.7039	0.4364
5.4888	-3.5113	0.191
3.3358	-2.5003	0.474
-0.0235	-1.4582	0.9156
1.9072	-1.9536	0.6618
0.2943	-1.6116	0.8739
0.9656	-1.9475	0.7856
1.9405	-2.4654	0.6574
5.7743	-3.6968	0.1535
3.0267	-3.1761	0.5147
-0.0664	-1.4157	0.9213
4.2748	-2.8986	0.3506
-0.0709	-1.3941	0.9219
0.0696	-1.5027	0.9034
0.4924	-1.4693	0.8478
1.3345	-2.1379	0.7371
2.3738	-2.7221	0.6005
3.4315	-3.5193	0.4614
3.6502	-2.6297	0.4327
-0.0525	-1.4383	0.9194
2.7352	-2.2626	0.553
2.1733	-2.0507	0.6268
0.207	-1.569	0.8853
0.9765	-1.6292	0.7842
0.8002	-1.8636	0.8073
2.8144	-3.0171	0.5426
0.2724	-1.3988	0.8767
1.732	-2.3497	0.6849

X Coordinate	Y Coordinate	Z Coordinate
1.4052	-1.7758	0.7278
4.5843	-3.0396	0.3099
0.516	-1.7211	0.8447
3.0307	-2.3781	0.5141
5.1931	-3.3429	0.2299
4.8909	-3.1868	0.2696
1.6511	-1.8621	0.6955
0.0179	-1.4779	0.9102
0.6324	-1.5149	0.8294
1.1463	-2.0403	0.7619
2.1547	-2.5891	0.6293
3.2327	-3.3434	0.4876
0.3973	-1.6623	0.8603
3.9633	-2.7622	0.3915
2.4493	-2.1536	0.5906
0.1324	-1.5329	0.8951
0.7938	-1.5681	0.8082
1.1803	-1.6983	0.7574
0.6503	-1.7881	0.827
6.2895	-4.1408	0.0858
4.4354	-4.7515	0.3295
4.9234	-5.891	0.2653
6.8003	-5.0072	0.0186
3.9779	-4.0986	0.3896
4.8558	-5.6701	0.2742
4.6774	-5.2156	0.2977
5.0257	-6.3142	0.2519
6.9416	-5.917	0
6.5028	-4.4068	0.0577
4.294	-4.5261	0.3481
6.9279	-5.6206	0.0018
6.8822	-5.3159	0.0078
4.1413	-4.3084	0.3681
6.0437	-3.9049	0.1181
3.8048	-3.897	0.4124
4.5647	-4.9842	0.3125
4.9791	-6.1061	0.258
6.9256	-6.2018	0.0021
6.6756	-4.7012	0.035
4.7742	-5.4446	0.2849
5.3029	-7.2267	0.2154
5.6751	-7.5271	0.1665
5.6593	-7.5207	0.1686
5.8585	-7.5708	0.1424
6.3575	-7.3966	0.0768
5.6311	-7.5082	0.1723

X Coordinate	Y Coordinate	Z Coordinate
6.8808	-6.4719	0.008
5.1462	-6.8609	0.236
5.4188	-7.3648	0.2002
5.6112	-7.4985	0.1749
6.1231	-7.5325	0.1076
5.7232	-7.5441	0.1602
6.0208	-7.5615	0.1211
5.1924	-7.0047	0.23
6.6025	-7.1293	0.0446
5.2451	-7.1269	0.223
5.5182	-7.4443	0.1871
5.6593	-7.5207	0.1686
5.6472	-7.5155	0.1702
5.8001	-7.563	0.1501
5.932	-7.5721	0.1327
6.2358	-7.4797	0.0928
6.8079	-6.7238	0.0176
5.1055	-6.6971	0.2414
5.6963	-7.5351	0.1637
5.3615	-7.3045	0.2077
5.557	-7.4689	0.182
5.5877	-7.4863	0.178
6.4818	-7.2802	0.0605
5.4717	-7.4104	0.1932
5.7559	-7.5533	0.1559
6.7131	-6.9435	0.0301
5.0668	-6.5145	0.2465

It will also be appreciated that the airfoil disclosed in the above Table may be scaled up or down geometrically for use in other similar turbine designs. Consequently, the coordinate values set forth in Table I may be scaled upwardly or downwardly such that the airfoil section shape remains unchanged. A scaled version of the coordinates in Table I would be represented by X, Y and Z coordinate values multiplied or divided by the same constant or number.

In Figures 3 and 4, the radially outermost profile 52 is illustrated with various other profile sections illustrated in Figure 4 along the length of the airfoil. The various profiles are also illustrated in Figure 6 with the profiles being superposed one over the other.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

WHAT IS CLAIMED IS:

1. A turbine nozzle (12) having a nozzle vane (14) in the shape of an airfoil in an envelope within ±0.100 inches in a direction normal to any airfoil surface location wherein the airfoil has an uncoated nominal profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at a radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate values, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil shape.

2. A turbine nozzle according to Claim 1 forming part of a second stage of a turbine.

3. A turbine nozzle (12) having a nozzle vane (14) in the shape of an airfoil having an uncoated nominal airfoil profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at a radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate values, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil profile;

the X, Y and Z values being scaled as a function of the same constant or number to provide a scaled-up or scaled-down nozzle airfoil.

4. A turbine nozzle according to Claim 3 forming part of a second stage of a turbine.

5. A turbine comprising a turbine nozzle (12) having a plurality of vanes (14), each of said vanes being in the shape of an airfoil in an envelope within ±0.100 inches in a direction normal to any nozzle airfoil surface location wherein the airfoil has an uncoated nominal profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at a radially innermost aerodynamic section of the airfoil and then made relative to

that section for the Z coordinate values, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil shape.

6. A turbine according to Claim 5 wherein the turbine nozzle comprises a second stage of the turbine.

7. A turbine according to Claim 5 wherein the turbine nozzle has sixty vanes.

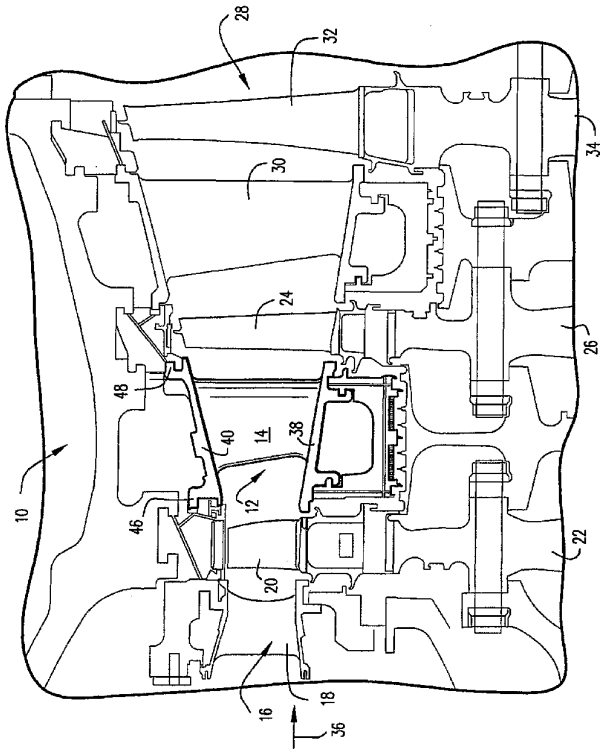
8. A turbine comprising a turbine nozzle (12) having a plurality of vanes (14), each of said vanes being in the shape of an airfoil having an uncoated nominal airfoil profile substantially in accordance with Cartesian coordinate values of X, Y and Z set forth in inches in Table I with the X, Y and Z values commencing at the radially innermost aerodynamic section of the airfoil and then made relative to that section for the Z coordinate values, the profiles at the Z distances being joined smoothly with one another to form the complete airfoil shape;

the X, Y and Z values being scaled as a function of the same constant or number to provide a scaled-up or scaled-down nozzle airfoil.

9. A turbine according to Claim 8 wherein the turbine nozzle comprises a second stage of the turbine.

10. A turbine according to Claim 8 wherein the turbine nozzle has sixty vanes.

Fig. 1



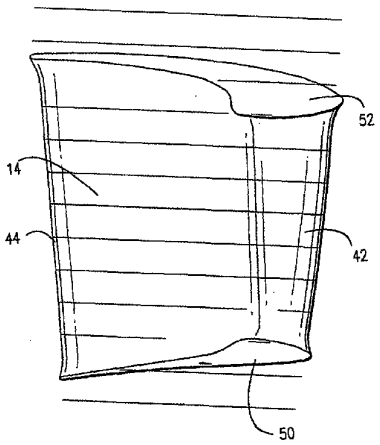


Fig. 2

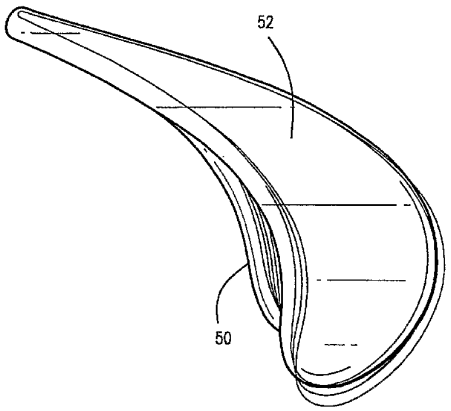


Fig. 3

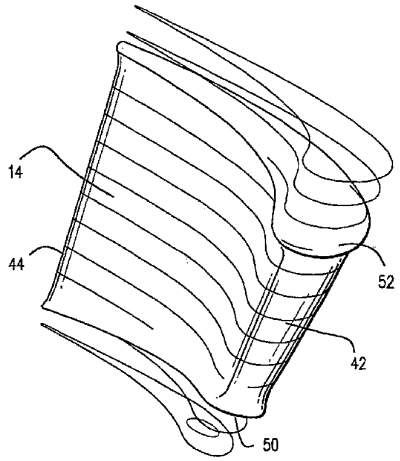


Fig. 4

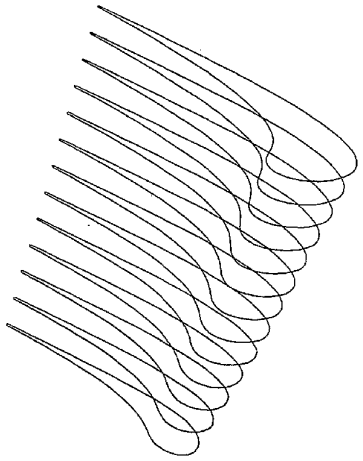


Fig. 5

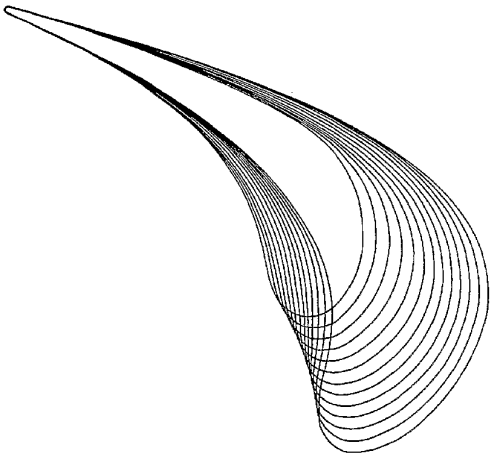


Fig. 6

【国際調査報告】

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/21887

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F01D5/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	US 6 450 770 B1 (SIMS CALVIN L ET AL) 17 September 2002 (2002-09-17) the whole document ---	3,4,8-10
E	US 6 461 110 B1 (JACALA ARIEL CAESAR-PREPENA ET AL) 8 October 2002 (2002-10-08) the whole document ---	3,4,8-10
E	US 6 461 109 B1 (BRUNNER FREDERICK JAMES ET AL) 8 October 2002 (2002-10-08) the whole document ---	3,4,8-10
P,X	US 6 398 489 B1 (BURDGICK STEVEN SEBASTIAN ET AL) 4 June 2002 (2002-06-04) the whole document ---	3,4,8-10

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 October 2002	11/11/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Argentini, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/21887

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 887 513 A (GEN ELECTRIC) 30 December 1998 (1998-12-30) the whole document	3,4,8-10
X	US 5 286 168 A (SMITH M LAWRENCE) 15 February 1994 (1994-02-15) the whole document	3,4,8-10
X	WO 01 27443 A (TAKASUMI MASAKAZU ;YAMAZAKI YOSHIAKI (JP); HITACHI LTD (JP); IKEUC) 19 April 2001 (2001-04-19) page 19 -page ON; figures	3,4,8-10
X	US 5 354 178 A (FERLEGER JUREK ET AL) 11 October 1994 (1994-10-11) tables I-IV	3,4,8-10
X	US 5 299 915 A (DINH CUONG V ET AL) 5 April 1994 (1994-04-05) table I	3,4,8-10
X	US 5 267 834 A (DINH CUONG V ET AL) 7 December 1993 (1993-12-07) table I	3,4,8-10
X	US 5 160 242 A (BROWN WILMOTT G) 3 November 1992 (1992-11-03) tables I,II	3,4,8-10
X	EP 0 112 003 A (WESTINGHOUSE ELECTRIC CORP) 27 June 1984 (1984-06-27) page 10 -page 11 page 13	3,4,8-10
A	US 4 411 940 A (FETHEROFF CHARLES W ET AL) 25 October 1983 (1983-10-25) figure 1	3,4,8-10

-/--

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/21887

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	GENERAL ELECTRIC POWER SYSTEM: "Utility Advanced Turbine Systems (ATS) Technology Readiness Testing - Phase 3 Restructured (3R): Program Plan Including Technical Approach/Statement of Work and Project Schedule for Budget Period 4, DE-FC2-95MC31176--26" WEBSITE OF THE U.S. DEPARTMENT OF ENERGY'S OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION (OSTI), 'Online! 17 March 2001 (2001-03-17), XP002218212 Shenectady, NY12345 Retrieved from the Internet: <URL:http://www.osti.gov/gpo/servlets/purl /766360-jj8vEG/webviewable/766360.pdf> 'retrieved on 2002-10-24! page 18, paragraph 1 page 21, paragraph 1 ---	3,4,8-10
X	POWER GENERATION SYSTEM, GENERAL ELECTRIC COMPANY: "Utility Advanced Turbine Systems (ATS) Technology Readiness Testing and Pre-Commercial Demonstration - Phase 3: Quarterly Report October 1 - December 31, 1995, DOE/MC/31176--5340" WEBSITE OF THE U.S. DEPARTMENT OF ENERGY'S OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION (OSTI), 'Online! 1 May 1997 (1997-05-01), pages 1-29, XP002218213 Shenectady, NY12345 Retrieved from the Internet: <URL:http://www.osti.gov/gpo/servlets/purl /486029-yoKOxU/webviewable/486029.pdf> 'retrieved on 2002-10-24! page 2, paragraph 2.2.1 page 5, paragraph 2.2.2.4 ----	3,4,8-10

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

International Application No. PCT/US 02 21887

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1,2,5-7

P.C.T. rule 6.2.a

The claims refer to the shape of aerodynamic profiles by the only mean of a numeric coordinate table. Due to the tolerances claimed the description includes most the aerofoil profiles usable in a gas turbine. Therefore, an accurate anteriority search became impossible.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/21887

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1,2,5-7
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 02/21887

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 6450770	B1	17-09-2002	NONE		
US 6461110	B1	08-10-2002	NONE		
US 6461109	B1	08-10-2002	NONE		
US 6398489	B1	04-06-2002	EP	1231358 A2	14-08-2002
			JP	2002276303 A	25-09-2002
EP 0887513	A	30-12-1998	US	5980209 A	09-11-1999
			CZ	9801599 A3	13-01-1999
			EP	0887513 A2	30-12-1998
US 5286168	A	15-02-1994	JP	5256102 A	05-10-1993
WO 0127443	A	19-04-2001	WO	0127443 A1	19-04-2001
			AU	6123799 A	23-04-2001
US 5354178	A	11-10-1994	US	5352092 A	04-10-1994
			SE	509299 C2	11-01-1999
			SE	9404004 A	10-06-1995
			DE	69423180 D1	06-04-2000
			DE	69423180 T2	17-08-2000
			EP	0654585 A1	24-05-1995
US 5299915	A	05-04-1994	NONE		
US 5267834	A	07-12-1993	NONE		
US 5160242	A	03-11-1992	CA	2070099 A1	01-12-1992
			JP	5149104 A	15-06-1993
			KR	227052 B1	15-10-1999
EP 0112003	A	27-06-1984	AU	568313 B2	24-12-1987
			AU	1996383 A	03-05-1984
			BR	8305902 A	29-05-1984
			CA	1210334 A1	26-08-1986
			DE	3377925 D1	13-10-1988
			EP	0112003 A1	27-06-1984
			ES	526667 D0	16-04-1985
			ES	8504330 A1	01-07-1985
			IE	54653 B1	20-12-1989
			IL	69920 A	31-10-1988
			IN	158893 A1	14-02-1987
			JP	1656156 C	13-04-1992
			JP	3012641 B	20-02-1991
			JP	59131704 A	28-07-1984
			KR	9110034 B1	10-12-1991
			MX	157076 A	26-10-1988
US 4411940	A	25-10-1983	US	4334495 A	15-06-1982
			AU	534262 B2	12-01-1984
			AU	4845179 A	17-01-1980
			CA	1123345 A1	11-05-1982
			DE	2967523 D1	07-11-1985
			EP	0007207 A1	23-01-1980
			EP	0077476 A2	27-04-1983
			IL	57529 A	31-03-1983

Form PCT/ISA/210 (patent family annex) (July 1992)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/US 02/21887

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4411940 A		IL 64517 A	29-04-1988
		JP 1431569 C	24-03-1988
		JP 55015694 A	02-02-1980
		JP 62040072 B	26-08-1987
		US 4358471 A	09-11-1982

Form PCT/ISA/210 (patent family annex) (July 1992)

フロントページの続き

(72)発明者　ビーレク，クレイグ・アレン
アメリカ合衆国、２９６８１、サウス・カロライナ州、シンプソンビル、サマー・ヒル・ロード、１０９番
(72)発明者　ヴォー，タン
アメリカ合衆国、２９６８１、サウス・カロライナ州、シンプソンビル、パロミノ・コート、８１８番
(72)発明者　ブルンナー，フレデリック・ジェームズ
アメリカ合衆国、２９６８０、サウス・カロライナ州、シンプソンビル、ハンタードン・コート、１１番

Ｆターム(参考) 3G002 GA07 GB05