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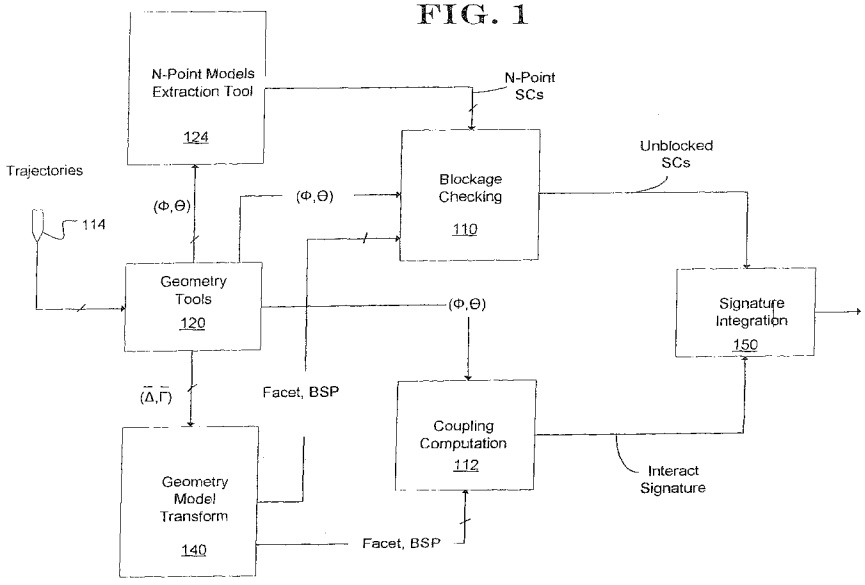
Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:
— *with international search report*

[Continued on next page]

(54) Title: RCS SIGNATURE GENERATION FOR CLOSELY SPACED MULTIPLE OBJECTS USING N-POINT MODELS

FIG. 1



(57) Abstract: A method and system for analyzing the RCS of an object using N Point signature prediction models is provided. N-point signature prediction models are created for each object in a scenario and stored in lookup tables. Shooting and Bounce trace back techniques are used to determine RCS signatures of multiple objects in modeled scenarios to account for blockage by and coupling phenomena of a scattered field.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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A. CLASSIFICATION OF SUBJECT MATTER
INV. G01S7/41

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)
G01S

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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LOZANO L ET AL: "Improvements in Ray-Tracing Acceleration Techniques to Compute Diffraction Effect and Doubles and Triples Effects in the RCS Prediction of Complex Targets" ANTENNAS AND PROPAGATION SOCIETY SYMPOSIUM, 2005. IEEE WASHINGTON, DC, JULY 3 - 8, 2005, PISCATAWAY, NJ : IEEE, US, vol. 3A, 3 July 2005 (2005-07-03), pages 93-96, XP010859931 ISBN: 978-0-7803-8883-3 the whole document ----- -/--	1-16

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

[X] See patent family annex.

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
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International application No
PCT/US2008/072433

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SCHMITZ J L ET AL: "Zpatch. A high frequency bistatic signature prediction code" RADAR CONFERENCE, 1997., IEEE NATIONAL SYRACUSE, NY, USA 13-15 MAY 1997, NEW YORK, NY, USA,IEEE, US, 13 May 1997 (1997-05-13), pages 232-236, XP010224771 ISBN: 978-0-7803-3731-2 the whole document	8,9, 12-16
A	YU C L ET AL: "Radar cross section computation and visualization by shooting-and-bouncing ray (SBR) technique" PROCEEDINGS OF THE ANTENNAS AND PROPAGATION SOCIETY INTERNATIONAL SYMPOSIUM (APSIS). CHICAGO, JULY 20 - 24, 1992; [PROCEEDINGS OF THE ANTENNAS AND PROPAGATION SOCIETY INTERNATIONAL SYMPOSIUM (APSIS)], NEW YORK, IEEE, US, vol. -, 18 July 1992 (1992-07-18), pages 1323-1326, XP010065787 ISBN: 978-0-7803-0730-8 the whole document	1-16
A	SAVIDES T ET AL: "Radar simulation using the shooting and bouncing ray tecunique" CCECE 2003. CANADIAN CONFERENCE ON ELECTRICAL AND COMPUTER ENGINEERING . MONTREAL, CANADA, MAY 4 - 7, 2003; [CANADIAN CONFERENCE ON ELECTRICAL AND COMPUTER ENGINEERING], NEW YORK, NY : IEEE, US, vol. 1, 4 May 2003 (2003-05-04), pages 307-310, XP010653888 ISBN: 978-0-7803-7781-3 the whole document	1-16
A	US 2002/075260 A1 (BROKENSHIRE DANIEL ALAN [US] ET AL) 20 June 2002 (2002-06-20) abstract; figures 7A,7B	2,13
A	US 5 953 722 A (LAMPERT DAVID S [US] ET AL) 14 September 1999 (1999-09-14) abstract; figure 13	3,4,14, 15

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002075260 A1	20-06-2002	NONE	
US 5953722 A	14-09-1999	US 5974419 A	26-10-1999