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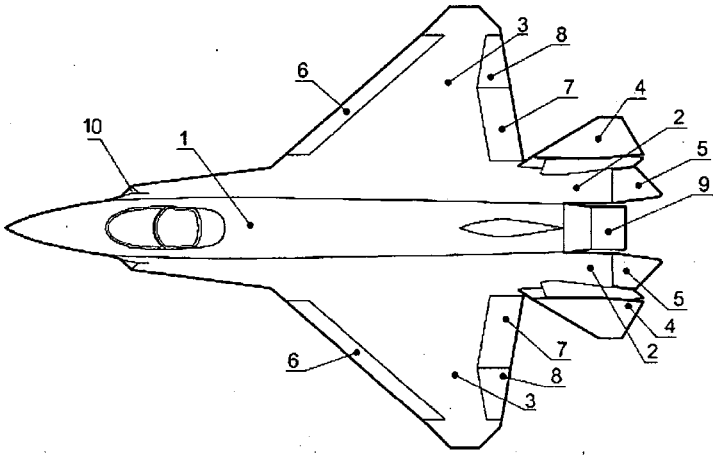
(54) Titre : Tactical light aircraft.

(57) **Abrégé :** The invention relates to aviation, in particular to a low radar signature light tactical aircraft. The technical result is an increase of the aircraft stability and controllability without deterioration in radar signature. The light tactical aircraft comprises a fuselage with advanced side tail beams, wing outer panels, an empennage, an air intake, a power plant, and a propulsive nozzle. The side tail beams are advanced and have end parts pivotable in a horizontal axis. The wing outer panels are designed highly swept, and comprise hinged leading edges, inboard elevons and outboard elevons. The empennage is designed V-shaped and comprises all-moving fins acting as both horizontal and vertical empennage. The air intake is arranged in a lower part of the fuselage and partially encloses the fuselage at the underside.

Fig.1



LIGHT TACTICAL AIRCRAFT

Technical field

The invention relates to aviation, in particular to low radar signature light tactical aircraft.

Background art

A supersonic convertible aircraft is known in the state of the art (see patent RU2432299C2 published 10/27/2011), the aircraft comprising a fuselage with a lower air intake and a V-shaped empennage.

However, the known aircraft design has a drawback of namely insufficient aircraft stability and controllability, as well as considerably large radar signature.

An aerial vehicle Lockheed F-117A Nighthawk is also known in the state of the art, which has low radar signature and is designed according to a tailless aerodynamic scheme with V-shaped empennage lacking horizontal empennage. A wing of the known aircraft has movable elevons. The elevons provide pitch and roll control, and all-moving vertical empennage provide yaw control.

However, the disadvantage of this aerial vehicle is poor take-off and landing performance, insufficient stability and controllability of the aerial vehicle.

The object of the claimed invention is to overcome drawbacks of the currently known aerial vehicles.

Disclosure of Invention

The technical result of the present invention is an increase of the aerial vehicle stability and controllability without deterioration in radar signature.

The light tactical aircraft comprises a fuselage with side tail beams, wing outer panels, an empennage, an air intake, a power plant, and a propulsive nozzle. The side tail beams are advanced and have the end parts pivotable in a horizontal axis. The wing outer panels are designed highly swept, and comprise hinged leading edges, inboard elevons and outboard elevons. The empennage is designed V-shaped and comprises all-moving fins acting as both horizontal and vertical empennage. The air intake is arranged in a lower part of the fuselage and partially encloses the fuselage at the underside.

The propulsive nozzle is rotatable and is arranged along the fuselage symmetry (longitudinal) axis; the propulsive nozzle is used for flight control and operational trim and is configured deflectable in a vertical plane.

The propulsive nozzle is rotatable and is arranged along the fuselage symmetry (longitudinal) axis; the propulsive nozzle is used for flight control and operational trim and is configured as an all-aspect unit.

Pivot axes of the all-moving V-shaped vertical fins are oriented perpendicular to the fuselage axis.

Pivot axes of the all-moving V-shaped vertical fins are located closer to the panels leading edge.

All air intake leading edges are configured swept-back.

Brief Description of Drawings

The invention is further explained in more detail with the following drawings:

Fig.1 shows a top view of the aerial vehicle according to the present invention;

Fig.2 shows a front view of the aerial vehicle according to the present invention;

Fig.3 shows a side view of the aerial vehicle according to the present invention.

Detailed Description

The claimed light tactical aircraft contains a fuselage (1) with advanced side tail beams (2) and an air intake (10) of a power plant, a wing (3) with outer panels, and a V-shaped empennage (4). The air intake (10) is arranged at the lower part of the fuselage (1) and partially encloses the fuselage (1) at the underside (see Fig. 2). The outer panels of the wing (3) are designed high swept (40-55°) and comprise deflectable wing leading edges (6). A trailing edge of the wing (3) outer panel comprises inboard elevons (7) and outboard elevons (8). The side tail beams (2) have rotatable parts (5) at their ends, which are configured to act as an elevator. The V-shaped empennage (4) is designed as all-moving and simultaneously functions as horizontal and vertical empennage. The V-shaped empennage (4) provides for the aircraft control in a longitudinal channel with an inphase deflection and in a lateral channel with a differential deflection. Furthermore, the V-shaped empennage (4)

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ensures stability and controllability in a directional channel at all flight speeds and performs air brake functions. Directional stability at supersonic flight speeds without sufficient static stability is induced by deflecting the fins of the all-moving V-shaped vertical empennage (4). In case of atmospheric disturbance or wind gusts, an inphase deflection of the fins of the all-moving V-shaped empennage (4) is performed in the directional channel to counteract the disturbance. Such solution allows to decrease the empennage area, which, in turn, reduces weight and drag of both the empennage and the whole aircraft. The directional channel control is performed by inphase deflection of the all-moving V-shaped (4) vertical fins, and air braking effect is produced by a differential deflection of the V-shaped empennage (4).

Pivot axes of the all-moving V-shaped fins are oriented perpendicular to the fuselage axis and located closer to each fin leading edge.

High lift devices (3) are provided for control in pitch and roll channels to increase the lift force. The hinged wing leading edge (6) is used for increasing a critical angle of attack and to provide a shock-free flow around the wing (3), to perform a "polar curve" flight during take-off, landing, maneuvering, and subsonic cruise. The elevons (7, 8) are designed to control the aircraft in pitch by a co-phased up-and-down deflection, to increase the lift force during a co-phased downward deflection at different modes due to increase of the wing mid-surface camber, to perform roll control with the differential deflection. When carrying out air braking functions, the elevons (7, 8) are deflected together with the other control surfaces in such a way to provide an aerodynamic drag increase with zero increment of the total pitching moment.

When deflected up and down, the pivotable parts (5) of the side tail beams are used to exert pitch control functioning as the lift elevator; at the take-off and landing modes they serve to compensate the negative pitching moment caused by deflecting the elevons (7, 8) to increase the wing lift force. When carrying out air braking functions, the pivotable parts (5) are deflected together with the other control elements to provide drag increase and zero increment of the total pitching moment.

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Swept-back design of all air intake leading edges reduces radar signature of the aerial vehicle.

Aircraft engine movable propulsive nozzle (9) is positioned along the fuselage symmetry axis; the propulsive nozzle (9) is used for flight control, adjustment and operational trim and can be designed either deflectable only up-and-down in a vertical plane, or as an all-aspect unit.

All available control surfaces (the V-shaped empennage, the leading edge flaps, the elevons, the fuselage side beams movable parts) when simultaneously deflected increase aerodynamic drag and function as drag flaps.

When all these control elements are provided in the aircraft structure, they jointly allow to move away the unbalanced static instability regions in the longitudinal and directional control channels towards the range of angles of attack 15° and more, to increase lifting capabilities, and to reduce drag of such aircraft aerodynamic configuration, as confirmed by the calculations and wind-tunnel tests of the aircraft model. Such configuration makes it possible to achieve operational angles of attack and lift-to-drag ratios that sufficiently improve cruise, maneuvering, and take-off and landing performance characteristics compared to the known equivalents.

The described configuration of light tactical aircraft according to the present invention ensures maximum aircraft controllability in any flight modes without increasing aircraft radar signature.

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Claims

1. A light tactical aircraft comprising:

a fuselage having a longitudinal axis, a lower part and an upper part and comprising side tail beams,

wing outer panels,

an empennage,

an air intake,

a power plant, and

a rotatable propulsive nozzle,

wherein the side tail beams of the fuselage are configured advanced and have end parts rotatable in a horizontal axis;

wherein the wing outer panels are configured highly swept and comprise hinged leading edges, inboard elevons and outboard elevons;

wherein the empennage is designed V-shaped and comprises all-moving fins having a pivot axis and a leading edge and configured to act as both horizontal and vertical empennage;

wherein the air intake is arranged in a lower part of the fuselage and partially encloses the fuselage at its underside.

2. The light tactical aircraft as claimed in claim 1, wherein the rotatable propulsive nozzle:

is arranged along a longitudinal axis of the fuselage;

is configured to exert flight control and adjustment and operational trim; and

is configured deflectable in a vertical plane.

3. The light tactical aircraft as claimed in claim 1, wherein the rotatable propulsive nozzle:

is arranged along the fuselage longitudinal axis;

is configured to exert flight control, adjustment and operational trim; and

is configured as an all-aspect unit.

4. The light tactical aircraft as claimed in claim 1, wherein the pivot axis of the all-moving V-shaped fins is oriented perpendicular to the fuselage longitudinal axis.

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5. The light tactical aircraft as claimed in claim 4, wherein the pivot axis of the all-moving V-shaped fins is offset towards the leading edge of the fins.

6. The light tactical aircraft as claimed in claim 4, wherein the air intake is arranged in the fuselage lower part and partially encloses the fuselage at its underside.

7. The light tactical aircraft as claimed in claim 4, wherein all air intake leading edges are configured swept-back.

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Abstract

The invention relates to aviation, in particular to a low radar signature light tactical aircraft. The technical result is an increase of the aircraft stability and controllability without deterioration in radar signature. The light tactical aircraft comprises a fuselage with advanced side tail beams, wing outer panels, an empennage, an air intake, a power plant, and a propulsive nozzle. The side tail beams are advanced and have end parts pivotable in a horizontal axis. The wing outer panels are designed highly swept, and comprise hinged leading edges, inboard elevons and outboard elevons. The empennage is designed V-shaped and comprises all-moving fins acting as both horizontal and vertical empennage. The air intake is arranged in a lower part of the fuselage and partially encloses the fuselage at the underside.

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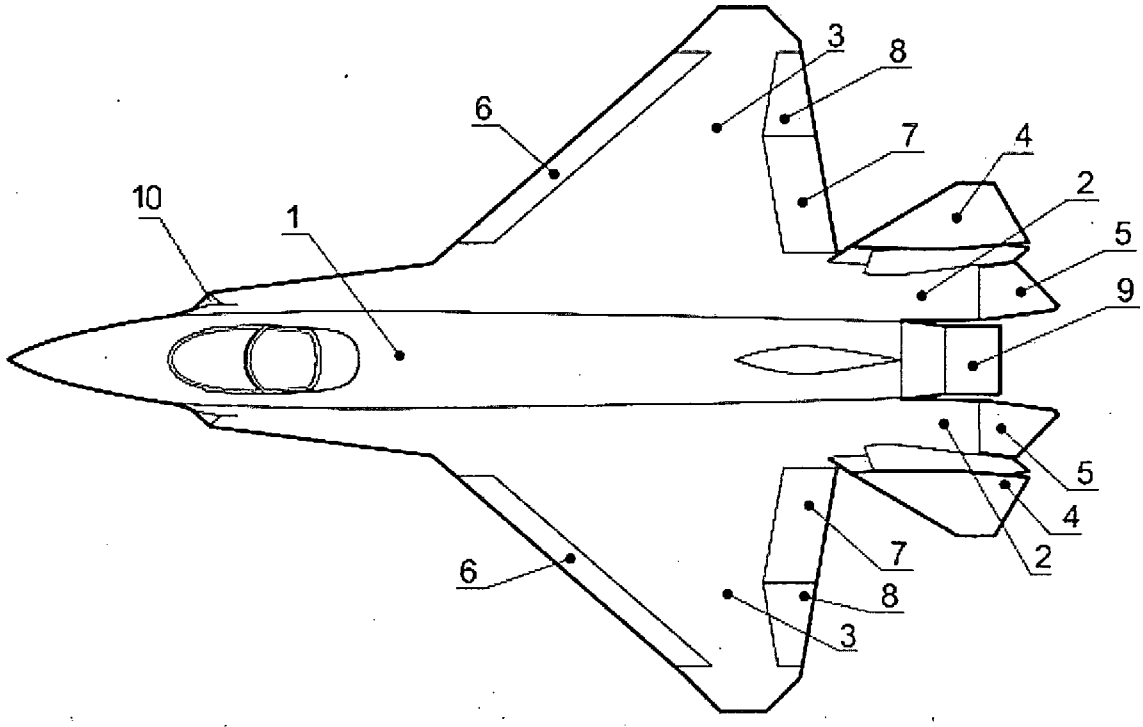

Fig. 1

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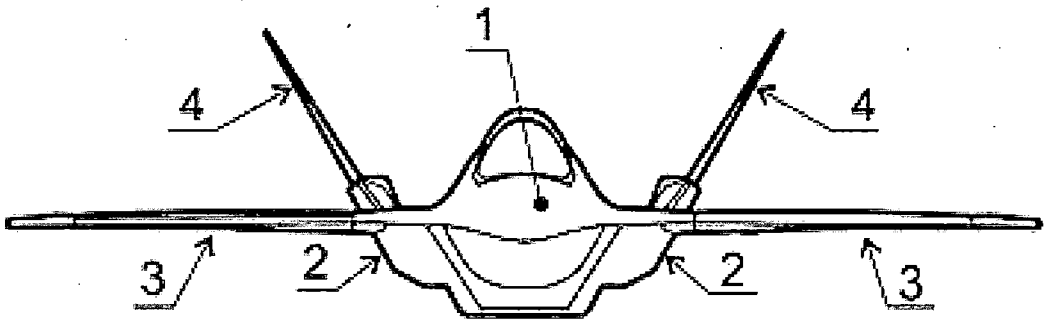

Fig. 2

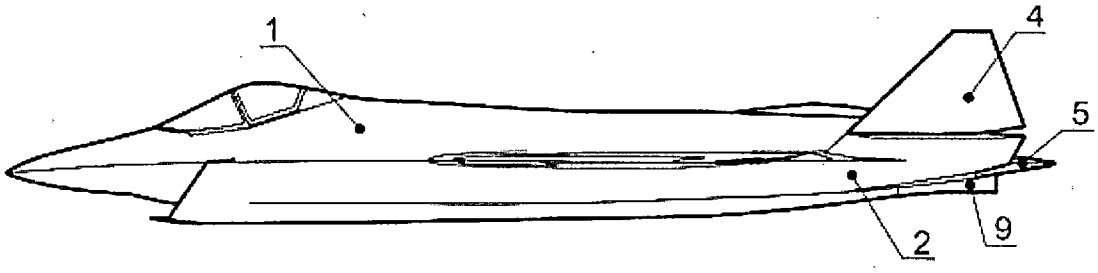

Fig. 3

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