CLAIMS:

1. A composite vehicle comprising:

a payload vehicle configured for powered spaceflight at least in a space medium, comprising a rocket driven propulsion system;

a booster vehicle configured for powered supersonic/hypersonic aerodynamic flight, comprising a ramjet propulsion system, and configured for transporting the composite vehicle between a first altitude and a second altitude under propulsive power provided by said ramjet propulsion system;

a first coupling system for selectively coupling and decoupling the payload vehicle with respect to the booster vehicle;

wherein the booster vehicle comprises an aerodynamic wing system configured for providing lift, stability and control to at least the composite vehicle at least at supersonic/transonic conditions between the first altitude and the second altitude; and

wherein said aerodynamic wing system comprises a vertical stabilizer arrangement including at least one fin pivotable between a stowed position and a deployed position, wherein in the stowed position in which the at least one fin has a first height dimension, and wherein in the deployed position in which the at least one fin has a second height dimension said second height dimension being greater than said first height dimension.

2. The composite vehicle according to claim 1, wherein said ramjet propulsion system comprises at least one of: a pure ramjet engine; a solid fuel integrated rocket ramjet engine (SFIRR); a scramjet engine; a dual mode ramjet/scramjet (DMRJ).

3. The composite vehicle according to any one of claims 1 to 2, wherein said booster vehicle has an absence of a turbojet-based propulsion system or a turbofan-based propulsion system.

~~**4.** The composite vehicle according to any one of claims 1 to 3, wherein the booster vehicle comprises an aerodynamic wing system configured for providing lift, stability and control to at least the composite vehicle at least at supersonic/transonic conditions between the first altitude and the second altitude.~~

~~5.~~**4.** The composite vehicle according to any one of claims 1 to 3~~claim 4~~, wherein said aerodynamic wing system comprises a delta wing.

~~6.~~**5.** The composite vehicle according to any one of claims 1 to 3~~claim 4~~, wherein said aerodynamic wing system comprises any one of: variable geometry wings; double delta wings; swept wings.

~~7. The composite vehicle according to any one of claims 4 to 6, wherein said aerodynamic wing system comprises a vertical stabilizer arrangement including at least one fin pivotable between a stowed position and a deployed position, wherein in the~~

~~stowed position in which the at least one fin has a first height dimension, and wherein in the deployed position in which the at least one fin has a second height dimension said second height dimension being greater than said first height dimension.~~

~~8.~~6. The composite vehicle according to any one of claims 1 to 5~~claim 7~~, wherein in the deployed position the at least one fin is configured for generating stability and control moments to at least the composite vehicle.

~~9.~~7. The composite vehicle according to any one of claims ~~7~~ 1 to ~~8~~6, wherein said booster vehicle comprises a fuselage, and said at least one fin is pivotably mounted to said fuselage.

~~10.~~8. The composite vehicle according to any one of claims ~~7~~ 1 to 6~~8~~, wherein said booster vehicle comprises said aerodynamic wing system, and said at least one fin is pivotably mounted to said aerodynamic wing system.

~~11.~~ ~~The composite vehicle according to any one of claims 4 to 6, wherein said aerodynamic wing system comprises a vertical stabilizer arrangement including at least one fin fixedly mounted to the booster vehicle.~~

~~12.~~9. The composite vehicle according to any one of claims 1 to ~~11~~8, wherein said rocket propulsion system comprises at least one of: a solid fuel rocket engine; a liquid fuel rocket engine.

~~13.~~10. The composite vehicle according to any one of claims 1 to ~~12~~9, wherein said payload vehicle has an absence of any one of: a ramjet based propulsion system; a turbojet based propulsion system; a turbofan based propulsion system.

~~14.~~11. The composite vehicle according to any one of claims 1 to ~~13~~10, wherein said payload vehicle comprises a payload vehicle payload bay configured for accommodating therein a payload.

~~15.~~**12.** The composite vehicle according to any one of claims 1 to ~~13~~10, wherein said first coupling system is configured for coupling the payload vehicle with the booster vehicle in longitudinal stacked arrangement, in which at least a forward part of the payload vehicle is longitudinally forward with respect to the booster vehicle.

~~16.~~**13.** The composite vehicle according to any one of claims 1 to ~~13~~10, wherein said first coupling system is configured for coupling the payload vehicle with the booster vehicle in transverse stacked arrangement, in which at least a first part of the payload vehicle is in transverse overlying relationship with respect to the booster vehicle.

~~17.~~**14.** The composite vehicle according to any one of claims 1 to ~~13~~10, wherein said booster vehicle comprises a booster vehicle payload bay, and wherein said first coupling system is configured for coupling the payload vehicle with respect to the booster vehicle payload bay.

~~18.~~**15.** The composite vehicle according to any one of claims 1 to ~~17~~14, wherein the payload vehicle is configured for transporting the ~~composite~~ payload vehicle at least between the second altitude and a desired altitude under propulsive power provided by said rocket propulsion system, the desired altitude being higher than the second altitude.

~~19.~~**16.** The composite vehicle according to any one of claims 1 to ~~18~~15, wherein said first altitude is the range between 10,000m and 20,000m, wherein optionally said second altitude is the range between 30,000m and 40,000m, and wherein said desired altitude is greater than 40,000m.

~~20. The composite vehicle according to any one of claims 1 to 19, wherein said second altitude is the range between 30,000m and 40,000m.~~

~~21. The composite vehicle according to any one of claims 18 to 20, wherein said desired altitude is greater than 40,000m.~~

~~22.~~**17.** A launch system, comprising:

the composite vehicle as defined in any one of claims 1 to ~~21~~16;

a carrier vehicle configured at least for powered subsonic/transonic/supersonic aerodynamic flight, and configured for

transporting said composite vehicle to at least said first altitude from a ground location;

a second coupling system for selectively coupling and decoupling the composite vehicle with respect to the carrier aircraft;

wherein said second coupling system is configured for coupling the composite vehicle with the carrier vehicle in a transverse stacked arrangement, in which the carrier vehicle comprises a carrier aircraft fuselage and the second coupling system is configured for selectively coupling and decoupling the composite vehicle directly with respect to a lower portion of the carrier aircraft fuselage.

~~23.~~18. The launch system according to claim ~~22~~17, wherein said carrier vehicle is a subsonic aircraft or a supersonic aircraft.

~~24.~~19. The launch system according to claim ~~21~~ 17 or claim ~~22~~18, wherein said second coupling system is configured for coupling the composite vehicle with the carrier vehicle in said transverse stacked arrangement, wherein in said transverse stacked arrangement ~~in which~~ the carrier vehicle is in at least partial transverse overlying relationship with respect to the composite vehicle.

~~**25.** The launch system according to claim 21 or claim 22, wherein said second coupling system is configured for coupling the composite vehicle with the carrier vehicle in said transverse stacked arrangement, in which the carrier vehicle comprises a carrier aircraft fuselage and the second coupling system is configured for selectively coupling and decoupling the composite vehicle directly with respect to a lower portion of the carrier aircraft fuselage.~~

~~26.~~20. The launch system according to any one of claims 17 to 19 ~~claim 25~~, wherein the composite air vehicle has a height dimension, when coupled to the carrier vehicle, less than the fuselage ground clearance of the carrier vehicle.

~~27.~~21. The launch system according to claim ~~26~~20, wherein said carrier vehicle is a Boeing 747 type aircraft.

~~**28.** The launch system according to claim 21 or claim 22, wherein said second coupling system is in the form of a wing pylon affixed to a port wing or a starboard wing of the carrier vehicle, and configured for coupling the composite vehicle with the carrier vehicle via the wing pylon.~~

29. The launch system according to claim 28, wherein said carrier vehicle is a Boeing 747 type aircraft, and said wing pylon is mounted to the port wing thereof at attached to anchor points on the underside of the port wing.

30. The launch system according to claim 21 or claim 22, wherein the carrier vehicle comprises two fuselages, each having an outboard wing, and further comprising an interconnecting wing interconnecting the two fuselages, and wherein said second coupling system is in the form of a wing pylon affixed to the interconnecting wing, and configured for coupling the composite vehicle with the carrier aircraft via the wing pylon.

31. The launch system according to claim 30, wherein said second coupling system is configured for coupling the composite vehicle with the carrier aircraft in transverse stacked arrangement, in which the composite vehicle is in at least partial transverse overlying relationship with respect to the carrier aircraft.

32. The launch system according to claim 21 or claim 22, wherein said second coupling system is configured for coupling the composite vehicle with the carrier vehicle in said transverse stacked arrangement, in which the carrier vehicle comprises a carrier aircraft fuselage and the second coupling system is configured for selectively coupling and decoupling the composite vehicle directly with respect to an upper portion of the carrier aircraft fuselage.

33. The launch system according to claim 21, wherein said carrier vehicle is in the form of a rocket booster, configured for propelling the composite vehicle to at least said first altitude from the ground location.

34. The launch vehicle according to claim 33, wherein the second coupling system is configured for coupling the composite vehicle with the carrier vehicle in transverse stacked arrangement, in which the carrier vehicle comprises a booster rocket body and the second coupling system is configured for selectively coupling and decoupling the composite vehicle directly with respect to a side portion of the booster rocket body.

~~35.~~**22.** A method for delivering a payload vehicle to a predetermined altitude, comprising:

(a) carrying the payload vehicle from a ground location to a first altitude via a carrier vehicle, while the payload vehicle is concurrently coupled to a booster vehicle to provide a composite vehicle; and decoupling the composite vehicle from the carrier vehicle at said first altitude and at a first predetermined forward speed;

(b) operating the uncoupled booster vehicle of the composite vehicle to transport the booster vehicle to at least a second altitude under propulsive power provided by a ramjet propulsion system comprised in the booster vehicle; and decoupling the payload vehicle from the booster vehicle at said second altitude and at a second predetermined forward speed;

(c) operating the payload vehicle to transport the payload vehicle to at least said predetermined altitude and at a third predetermined forward speed under propulsive power provided by a rocket propulsion system comprised in the payload vehicle;

wherein the payload vehicle, booster vehicle and composite vehicle are as respectively defined in any one of claims 1 to 16; and

wherein the carrier vehicle comprised in the launch system is as defined in any one of claims 17 to 21.

~~36. The method according to claim 35, wherein the payload vehicle, booster vehicle and composite vehicle are as respectively defined in any one of claims 1 to 21.~~

~~37. The method according to claim 35 or claim 36, wherein the carrier vehicle comprised in the launch system is as defined in any one of claims 21 to 34.~~

~~38.~~**23.** The method according to ~~any one of claims 35 to 37~~claim 22, wherein said first altitude is the range between 10,000m and 20,000m, and wherein optionally said second altitude is the range between 30,000m and 40,000m, and wherein optionally said desired altitude is greater than 40,000m.

~~39. The method according to any one of claims 35 to 38, wherein said second altitude is the range between 30,000m and 40,000m.~~

~~40.~~**24.** ~~The method according to any one of claims 35 to 39, wherein said desired altitude is greater than 40,000m.~~