Claims:

1. A vertical take-off and landing (VTOL) aircraft having:

a wing structure having right and left side forward wings; and

right and left side rearward wings, each of the right side wings being connected, and each of the left side wings being connected in a box wing configuration;

wherein each wing has a fixed leading edge and at least one moveable trailing control surface,

further wherein each wing has at least one motor pod having a motor, the motor pod being pivotally mounted to an underside of the fixed leading edge, and fixedly secured to the trailing control surface.

2. The vertical take-off and landing (VTOL) aircraft of claim 1, further comprising a mechanical actuator configured to pivot the motor pod and trailing control surface about a hinge point of the fixed leading edge.

3. The vertical take-off and landing (VTOL) aircraft of claim 2, wherein the actuator includes a mechanically driven rotating arm and a linkage.

4. The vertical take-off and landing (VTOL) aircraft of claim 3, wherein the rotating arm has a proximal end connected to an actuator motor of the motor pod, and the rotating arm has a distal end connected to a proximal end of the linkage, and a distal end of the linkage is pivotally connected to the fixed leading edge.

5. The vertical take-off and landing (VTOL) aircraft of any one of the preceding claims, further comprising a leading edge slot located between the fixed leading edge and the trailing control surface.

6. The vertical take-off and landing (VTOL) aircraft of claim 5, further comprising an upper slot cover hingedly mounted to an upper side of the fixed leading edge, wherein the upper slot cover generally covers the leading edge slot in a forward flight

configuration, and the leading edge slot is at least partially uncovered in a take-off and landing configuration.

7. The vertical take-off and landing (VTOL) aircraft of one of claims 5 or 6, further comprising a lower slot cover hingedly mounted to an underside of the fixed leading edge, the lower slot cover generally covers the leading edge slot in a forward flight configuration, and the leading edge slot is at least partially uncovered in a take-off and landing configuration.

8. The vertical take-off and landing (VTOL) aircraft of claim 7, wherein a trailing side of the lower slot cover and a trailing side of the upper slot cover are in abutment with each other to define an enclosed volume between the fixed leading edge, the upper slot cover and the lower slot cover.

9. The vertical take-off and landing (VTOL) aircraft of claim 8, wherein the trailing side of the lower slot cover and the trailing side of the upper slot cover are moveable and configured to slide relative to each other.

10. The vertical take-off and landing (VTOL) aircraft of any one of claims 7 to 9, wherein the upper slot cover is curved having a concaved surface which is generally downwardly facing in a forward flight configuration.

11. The vertical take-off and landing (VTOL) aircraft of any one of claims 7 to 10, wherein the lower slot cover is curved having a generally "S" curve profile, having an upwardly facing concave surface adjacent to the leading edge, and a downwardly facing concave surface adjacent to the trailing side in a forward flight configuration.

12. The vertical take-off and landing (VTOL) aircraft of any one of claims 6 to 11, wherein the upper slot cover is defined by two or more members which are hingedly connected to achieve an articulated connection pivotal about an axis extending generally parallel with a longitudinal axis of the wing.

13. The vertical take-off and landing (VTOL) aircraft of any one of claims 6 to 11, wherein the upper slot cover is defined by a flexible member and/or connected to the fixed leading edge by a flexible member, the flexible member being fabricated from a material which is flexible about an axis extending generally parallel with a longitudinal axis of the wing.

14. The vertical take-off and landing (VTOL) aircraft of any one of the preceding claims, wherein each wing has at least two motor pods having motors, a first motor has rotors having an axis of rotation which is downwardly inclined relative to the control surface, and a second motor has rotors having an axis of rotation which is upwardly inclined relative to the control surface, such that the first and second motors have different thrust lines.

15 The vertical take-off and landing (VTOL) aircraft of claim 14, wherein the first and second motors are selectively operable at different rotation speeds to generate a turning moment to rotate the control surface relative to the fixed leading edge.

16. A vertical take-off and landing (VTOL) aircraft having:

a wing structure having right and left side forward mounted wings; and

right and left side rearward mounted wings, each of the right side wings being connected, and each of the left side wings being connected, to define a box wing structure;

each wing has a fixed leading edge and at least one moveable trailing control surface, and each wing has a first motor and a second motor, the motors being pivotally mounted to the fixed leading edge, and fixedly secured to the trailing control surface; and

a mechanical actuator configured to selectively pivot each motor and trailing control surface about a hinge point of the fixed leading edge;

wherein the first motor has a rotor having an axis of rotation which is downwardly inclined relative to the control surface, and the second motor has a rotor having an axis of rotation which is upwardly inclined relative to the control surface, such that the first and second motors have different thrust lines.

17. The vertical take-off and landing (VTOL) aircraft of any one of the preceding claims, wherein connecting members join tips of each wing located on the same side of the aircraft, the connecting members each being defined by a first arm secured to the forward wing, a second arm secured to the rearward wing and an intermediate elbow located at a junction of the first and second arms.

18. The vertical take-off and landing (VTOL) aircraft of any one of the preceding claims, wherein connecting members join tips of each wing located on the same side of the aircraft, the connecting members each having a generally linear body portion extending between the forward wing and the rearward wing.

19. The vertical take-off and landing (VTOL) aircraft of claim 17, wherein the first arm of the connecting member defines a pod for storage of batteries, fuel or other equipment.

20. The vertical take-off and landing (VTOL) aircraft of claim 19, wherein the pod is selectively removeable and interchangeable.

21. The vertical take-off and landing (VTOL) aircraft of claim 17, wherein the first arm of the connecting member defines a pod which provides a buoyant float configured for water landing and take-off.

22. The vertical take-off and landing (VTOL) aircraft of any one of claims 16 to 21, wherein a distal motor is located at or near a tip region of each forward wing, the distal motor being positioned generally in front of the connecting member.

23. The vertical take-off and landing (VTOL) aircraft of any one of the preceding claims, wherein the aircraft has a height to span ratio in the range of:

0.14 to 0.3 in a horizontal flight configuration; and

0.3 to 0.6 in a vertical flight configuration.

24. The vertical take-off and landing (VTOL) aircraft of any one of the preceding claims, wherein the trailing control surface has a length in profile of between about 50% to about 70% of a total chord length of the wing.

25. A wing structure adapted for mounting to a vertical take-off and landing (VTOL) aircraft, the wing structure having:

right and left side forward wings; and

right and left side rearward wings, each of the right side wings being adapted for connection, and each of the left side wings being adapted for connection in a box wing configuration;

wherein each wing has a fixed leading edge and at least one moveable trailing control surface,

further wherein each wing has at least one motor pod having a motor, the motor pod being adapted for pivotal mounting to an underside of the fixed leading edge, and to be fixedly secured to the trailing control surface.

26. A wing structure adapted for mounting to a vertical take-off and landing (VTOL) aircraft, the wing structure having right and left side wings adapted for forward mounting; and

right and left side wings adapted for rearward mounting, each of the right side wings being adapted for connection, and each of the left side wings being adapted for connection, to define a box wing structure;

each wing has a fixed leading edge and at least one moveable trailing control surface, and each wing has a first motor and a second motor, the motors being adapted for pivotal mounting to the fixed leading edge, and to be fixedly secured to the trailing control surface; and

a mechanical actuator configured to selectively pivot each motor and trailing control surface about a hinge point of the fixed leading edge;

wherein the first motor has a rotor adapted to have an axis of rotation which is downwardly inclined relative to the control surface, and the second motor has a rotor adapted to have an axis of rotation which is upwardly inclined relative to the control surface, such that the first and second motors have different thrust lines.

27. A method of controlling a vertical take-off and landing (VTOL) aircraft having a wing structure having right and left side forward mounted wings, and right and left side rearward mounted wings, each wing has a first motor and a second motor, the motors each being pivotally mounted to a fixed leading edge, and fixedly secured to a moveable trailing control surface, the first and second motors each having rotors having different thrust lines, the method including the steps of:

mechanically actuating one of the moveable trailing control surfaces to selectively pivot each motor and the trailing control surface about a hinge point of the fixed leading edge; and/or

aerodynamically actuating said moveable trailing control surface to selectively pivot each motor and the trailing control surface about the hinge point of the fixed leading edge,

wherein the step of aerodynamic actuation includes operating the first and second motors at different rotational speeds.

28. The method of claim 27, wherein the mechanical actuation step includes rotating a mechanically driven rotating arm, the rotating arm having a proximal end connected to an actuator motor of one of the first and second motors, and the rotating arm has a distal end connected to a proximal end of the linkage, and a distal end of the linkage is pivotally connected to the fixed leading edge.