CLAIMS

1. An aerial vehicle (1) comprising:

a main frame (3);

a plurality of operable multicopter units (2), each multicopter unit (2) having a plurality of propulsion units (5), wherein the plurality of propulsion units (5) are attached to the multicopter unit (2) at a fixed yaw angle, a fixed roll angle and a fixed pitch angle; and

characterized in that the main frame (3) has a plurality of arms (10) fixedly coupled thereto and extending radially therefrom and each operable multicopter unit (2) of the plurality of operable multicopter units (2) is attached to a respective arm (10) of the main frame (3) by interposition of one single joint (4) such that the multicopter units (2) rotate relative to the main frame (3) independently of one another, and where at least one of the joints (4) has a minimum of one degree of freedom, such that the main frame (3) has the same or a higher number of controllable degrees of freedom than a total number of degrees of freedom of the main frame (3).

2. The aerial vehicle (1) according to claim 1, wherein the joints (4) have a maximum of three degrees of freedom.

3. The aerial vehicle (1) according to any one of the preceding claims, wherein the joints (4) comprise a release system such that the plurality of operable multicopter units (2) are releasable attached to the main frame (3).

4. The aerial vehicle (1) according to any one of the preceding claims, wherein the joints (4) comprise locking means configured to restrict movement of the joints in at least one degree of freedom.

5. The aerial vehicle (1) according to any one of the preceding claims, wherein the joints (4) comprise blocking means configured to temporarily block movement of the joints (4) in at least one degree of freedom.

6. The aerial vehicle (1) according to any one of the preceding claims, wherein the joints (4) comprise shock absorbing means configured to absorb shock impulses generated by the movement of the multicopter units (2) relative to the main frame (3).

7. The aerial vehicle (1) according to any one of the preceding claims, wherein the joints

(4) are selected from a group comprising spherical joints, cardan joints, ball joints, constant velocity joints and any combination thereof.

8. The aerial vehicle (1) according to claim 1, wherein the plurality of operable multicopter units (2) are equidistantly located relative to a central point of the main frame.

9. The aerial vehicle (1) according to any one of the preceding claims, comprising a referencing processing unit located on the main frame (3) and configured to determine a displacement of the main frame (3) relative to a horizontal plane.

10. The aerial vehicle (1) according to any one of the preceding claims, comprising a controller (51) located in the main frame (3) configured to operate of the plurality of multicopter units (2).

11. The aerial vehicle (1) according to any one of the preceding claims, comprising:

a primary controller located in the main frame (3); and

a plurality of secondary controllers, each secondary controller being located in a corresponding multicopter unit (2);

wherein the plurality of secondary controllers is configured to operate the respective multicopter units (2) and the primary controller is configured to manage the plurality of secondary controllers.

12. A method (60) for manoeuvring an aerial vehicle, characterized in that it comprises:

providing (61) an aerial vehicle as claimed in claim 9;

determining (62), by the referencing processing unit, a displacement of the aerial vehicle relative to a horizontal plane;

determining (63), by a controller of the aerial vehicle, a thrust and a tilt angle for the aerial vehicle based on the determined displacement;

adjusting (64), by the controller, the thrust of each one of the plurality of multicopter units based on the determined thrust; and

adjusting (65), by the controller, the tilt angle of each one the plurality of multicopter units by performing a rotational movement of each multicopter unit relative to the main frame via the joints, the relative rotational movement being based on the determined tilt angle.

13. The method according to claim 12, wherein the aerial vehicle has a primary controller attached to the main frame and a secondary controller attached to each multicopter unit, wherein the plurality of secondary controllers are to operate the respective multicopter units

and the primary controller is to manage the plurality of secondary controllers, the method comprising:

determining, by the primary controller, the thrust and the tilt angle for the aerial vehicle based on the determined displacement;

adjusting, by each secondary controller, the thrust of the respective multicopter unit based on the determined thrust; and

adjusting, by each secondary controller, the tilt angle of the respective multicopter unit by performing a rotational movement of the multicopter unit relative to the main frame via the joints, the relative rotational movement being based on the determined tilt angle.

14. The method according to claim 12, wherein the aerial vehicle has a plurality of controllers configured to operate the plurality of multicopter units, the method comprising:

determining, by any one of the plurality of controllers, the thrust and the tilt angle for the aerial vehicle based on the determined displacement;

adjusting, by any one of the plurality of controllers, the thrust of the plurality of multicopter units based on the determined thrust; and

adjusting, by any one of the plurality of controllers, the tilt angle of the plurality of multicopter units by performing a rotational movement of the multicopter units relative to the main frame via the joints, the relative rotational movement being based on the determined tilt angle.