CLAIMS:

1. A method for controlling in-flight refueling of a receiver aircraft (20) having a fuel receptacle (22), comprising:

automatically maneuvering a non-aircraft-fixed refueling device (100), towed by a tanker aircraft (12) via a flexible fuel hose (52), to an engagement enabling position, including:

(i) repeatedly determining a spatial disposition of said refueling device with respect to the receiver aircraft, the refueling device being capable of engaging and refueling said receiver aircraft via a boom member (130), when the device arrives to said engagement enabling position at which said boom member is in a predetermined spaced and spatial relationship with respect to the fuel receptacle of said receiver aircraft;

(ii) repeatedly calculating maneuvering commands based at least on the repeatedly determined spatial dispositions and on characteristics of a spatial control system (160) of the refueling device;

(iii) sending said maneuvering commands to said spatial control system;

whereby at said engagement enabling position, the boom member of said refueling device is capable of engaging with said fuel receptacle to enable refueling of said receiver aircraft; and

maintaining the refueling device at the engagement enabling position.

2. The method according to claim 1, further comprising providing an instruction to the refueling device (100), in response to its arriving at said engagement enabling position, causing the refueling device to move the boom member (130) in a predetermined trajectory for automatically engaging with said fuel receptacle (22).

3. The method according to any one of the preceding claims, further comprising:

determining an engagement area specification condition;

repeatedly calculating maneuvering instructions for said receiver aircraft (20) based on said spatial dispositions and an engagement area specification; and

invoking said automatically maneuvering in response to meeting said engagement area specification condition.

4. The method according to claim 3, further comprising providing said maneuvering instructions to at least one of a pilot of said receiver aircraft (20) or a pilot of the tanker aircraft (12).

5. The method according to claim 4, wherein said providing said maneuvering instructions comprises activating a signaling system (2420), optionally mounted on said refueling device (100) or said tanker aircraft (12).

6. The method according to any one of claims 2 to 5, further comprising activating a force generating arrangement (190) in the refueling device (100) for generating force in the direction of the fuel receptacle (22) of the receiver aircraft (20) in response to receiving an engagement command for enabling refueling.

7. The method according to any one of the preceding claims, wherein said determining a spatial disposition comprises:

acquiring an image of said receiver aircraft (20), said image comprising depth data and electromagnetic data;

comparing said depth data and said electromagnetic data with look-up tables comprising reference depth data and reference electromagnetic data relating to reference spatial dispositions with respect to the receiver aircraft;

determining, based on said comparing, the spatial disposition of said refueling device (100) with respect to said receiver aircraft.

8. A system for controlling in-flight refueling of a receiver aircraft (20) having a fuel receptacle (22), comprising:

a steering control module (1830) configured to automatically maneuver a non-aircraft-fixed refueling device (100), towed by a tanker aircraft (12) via a flexible fuel hose (12), to an engagement enabling position, including:

(i) repeatedly determine a spatial disposition of said refueling device with respect to the receiver aircraft, the refueling device being capable of engaging and refueling said receiver aircraft via a boom member (130), when the device arrives to said engagement enabling position at which said boom member is in a predetermined spaced and spatial relationship with respect to the fuel receptacle of said receiver aircraft;

(ii) repeatedly calculate maneuvering commands based at least on the repeatedly determined spatial dispositions and on characteristics of a spatial control system (160) of the refueling device;

(iii) send said maneuvering commands to said spatial control system for automatically maneuvering said refueling device to said engagement enabling position;

whereby at said engagement enabling position, the boom member of said refueling device is capable of engaging with said fuel receptacle to enable refueling of said receiver aircraft; and

the steering control module being further configured to maintain the refueling device at the engagement enabling position.

9. The system according to claim 8, further comprising an engagement/disengagement module (1850) configured to provide an instruction to the refueling device (100), in response to its arriving at said engagement enabling position, causing the refueling device to move the boom member (130) in a predetermined trajectory to automatically engage with said fuel receptacle (22).

10. The system according to any one of claims 8 to 9, further comprising a maneuvering instructions module (1820) configured to determine an engagement area specification condition, to repeatedly calculate maneuvering instructions for said receiver aircraft (20) based on said spatial dispositions and an engagement area specification, and to invoke said steering control module (1830) to automatically maneuver said refueling device (100) to said engagement enabling position in response to meeting said engagement area specification condition.

11. The system according to claim 10, wherein said maneuvering instructions module (1820) is further configured to provide said maneuvering instructions to at least one of a pilot of said receiver aircraft (20) or a pilot of the tanker aircraft (12).

12. The system according to claim 11, wherein said maneuvering instructions module (1820) is configured to activate a signaling system (2420) in order to provide said maneuvering instructions, said signaling system is optionally mounted on said refueling device (100) or said tanker aircraft (12).

13. The system according to any one of claims 8 to 12, wherein said engagement/disengagement module (1850) is further configured to activate a force generating arrangement (190) in the refueling device (100) for generating force in the direction of the fuel receptacle (22) of the receiver aircraft (20) in response to receiving an engagement command for enabling refueling.

14. The system according to any one of claims 8 to 13, wherein said steering control module (1830) is configured to perform the following steps in order to determine a spatial disposition:

acquiring an image of said receiver aircraft (20), said image comprising depth data and electromagnetic data;

comparing said depth data and said electromagnetic data with look-up tables comprising reference depth data and reference electromagnetic data relating to reference spatial dispositions with respect to the receiver aircraft;

determining, based on said comparing, the spatial disposition of said refueling device (100) with respect to said receiver aircraft.

15. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform a method of claim 1.