**CLAIMS**

1. A method for adaptive dynamic positioning of a vessel during offshore charging from a power station, actively assisted by a cable management system, the method comprising the steps of:

(i) establishing a control link between said cable management system, configured to control at least one characteristic parameter of a charging cable connected between the power station and the vessel, and a positioning control system, configured to control a propulsion system of the vessel so as to move the vessel relative to the power station;

(ii) defining, relative to the power station and based on said at least one characteristic parameter of said charging cable, a first target zone, adapted to effect vessel movement (response) of a first type, and at least one second target zone containing said first target zone, adapted to effect vessel movement of at least one second type;

(iii) monitoring any one of said at least one characteristic parameter of said charging cable, at least one performance parameter of said propulsion system, a vessel position and/or a vessel heading) relative to the power station, and at least one environmental parameter;

(iv) selectively modifying said first target zone and/or said at least one second target zone in response to a predetermined change of any one of said at least one characteristic parameter of said charging cable, at least one performance parameter of said propulsion system, said vessel position relative to the power station, and said at least one environmental parameter;

(v) controlling said positioning control system and said cable management system, so as to maintain the vessel within or move the vessel back towards said first target zone in accordance with said vessel movement of a first type and said vessel movement of a second type, respectively.

2. A method according to claim 1, wherein said vessel movement of a first type is a passive vessel movement assisted by said cable management system via said charging cable.

3. A method according to any one of the preceding claims, wherein said vessel movement of a second type is an active vessel movement actuated by said propulsion system and assisted by said cable management system via said charging cable.

4. A method according to any one of the preceding claims, wherein said at least one characteristic parameter of said charging cable comprises any one of a cable length, a cable tension and a cable catenary.

5. A method according to any one of the preceding claims, wherein said at least one performance parameter of said propulsion system comprises any one of an energy power consumption rate, an energy charging rate, an energy storage capacity.

6. A method according to any one of the preceding claims, wherein said cable management system is adapted to provide dynamic feedback to said position control system and vice versa, so as to operably coordinate actions of said cable management system with actions of said position control system.

7. A method according to any one of the preceding claims, wherein step (ii) is based on at least one environmental parameter in addition to said characteristic parameter of said charging cable, said at least one environmental parameter being measured in real-time and/or provided from historical data, and/or provided from a predictive model.

8. A method according to any one of the preceding claims, wherein said vessel position and said vessel heading relative to said power station is provided by any one of a Global Navigation Satellite System (GNSS), an acoustic- or radar based position reference system and an optical- or laser based position reference system.

9. A method according to any one of the preceding claims, wherein step (v) further comprises controlling a cable guide and/or a cable connector provided at the power station and/or at the vessel so as to optimise cable alignment between the power station and the vessel, during charging, and wherein said cable guide and/or said cable connector are actively actuatable or passively actuatable.

10. A method according to any one of the preceding claims, wherein step (ii) and/or step (iv) utilise artificial intelligence (AI) to define and/or selectively modify any one of said first target zone and at least one second target zone based on any one of said at least one characteristic parameter of said charging cable, said at least one performance parameter of said propulsion system, said vessel position relative to the power station, and said at least one environmental parameter.

11. A system for actively assisted adaptive dynamic positioning of a vessel during offshore charging from a power station, comprising:

a cable management system, configured to control at least one characteristic parameter of a charging cable connected between the power station and the vessel;

a positioning control system, configured to control a propulsion system of the vessel;

a controller, configured to operably control said cable management system and said positioning control system for carrying out the method according to any one of claims 1 to 13.

12. A system according to claim 11, wherein said cable management system comprises an adaptive catenary and tension control system configured to monitor and control said at least one characteristic parameter of said charging cable, wherein said characteristic parameter comprises any one of a cable length, a cable tension and a cable catenary.

13. A system according to claim 12, wherein said adaptive catenary and tension control system comprises a motor driven reeling drum.

14. A system according to any one of claims 11 to 13, further comprising at least one cable connector, adapted to operably connect to an end portion of said charging cable, wherein said at least one cable connector is adapted to actively and/or passively rotate in line with the orientation of said charging cable, during use.

15. A system according to any one of claims 11 to 14, wherein said cable management system further comprises at least one cable guide adapted to provide for a predetermined rotational movement of said charging cable, during use, and wherein said cable guide is actively and/or passively controllable.