CLAIMS

1. A dynamic active control system for a marine vessel, the system comprising:

an engine having an embedded engine control module;

a software module communicatively and operatively connected to the engine control module;

a plurality of water engagement device actuators adapted to be mounted on a transom of the marine vessel and communicatively and operatively connected to the software module;

wherein the plurality of water engagement device actuators comprises at least one pair of water engagement device actuators;

wherein the software module provides a first signal output to the plurality of water engagement device actuators to command a water engagement device delta position in order to combat dynamic motions of the marine vessel resulting from both steering forces acting upon the marine vessel and environmental forces acting upon the marine vessel;

wherein the software module measures a relationship between an engine steering angle and the water engagement device delta position and, in response thereto, provides a second signal output to the plurality of water engagement device actuators; and

wherein the plurality of water engagement device actuators receive the second signal output and, in response thereto, automatically generate a change in the water engagement device delta position to counter a roll motion resulting from a steering position change.

2. The system of claim 1, further configured for automatically adjusting the engine steering angle to counter a drag moment generated from the water engagement device delta position.

3. The system of claim 1, wherein the software module includes an embedded microprocessor configured to run program instructions, the system further comprising:

a plurality of sensors embedded within the software module; and

an adjustable steering position control embedded within the engine control module.

4. The system of claim 1, further comprising a plurality of sensors located in proximity to the software module; and wherein each of the plurality of sensors is communicatively and operatively connected to the software module.

5. The system of claim 1, wherein the system is capable of automatically adjusting the engine steering angle in order to counter the resulting heading change from the water engagement device delta position.

6. The system of claim 1, further configured to generate the water engagement device delta position changes in 100 mm/s or more to counter the roll motion resulting from the steering position change.

7. The system of claim 1, further configured to read the change in steering position from a manual operator input or via an autopilot system.

8. The system of claim 7, wherein the system is capable of:

receiving a desired trim angle input from the operator; and

adjusting average positions of the water engagement device(s) along with the engine trim angle in an effort to achieve the operator's desired trim angle.

9. The system of claim 7, wherein the system is capable of:

receiving a desired trim angle input from the operator; and

adjusting the relationship between engine trim angle and average position of the plurality of the water engagement device(s) in order to optimize the performance of the system.

10. The system of claim 1, further comprising an operational console having a plurality of display consoles connected to at least one input device.

11. The system of claim 3, wherein the plurality of sensors comprises:

at least one multi-axis inertial sensor for measuring rates or acceleration generated along multiple vector axes during the operation of the marine vessel; and

at least one accelerometer sensor for measuring the longitudinal acceleration, lateral acceleration and vertical acceleration of the marine vessel respectively.

12. The system of claim 3, wherein the plurality of sensors comprises at least one Roll Rate Sensor (RRS), Pitch Rate Sensor (PRS) and Yaw Rate Sensor (YRS) to measure the roll rate, pitch rate and yaw rate of the marine vessel respectively.

13. The system of claim 3, wherein the software module is programmed to make certain iterative decisions based on information received from at least one attitude sensor and/or from at least one global positioning system (GPS) sensor located within the marine vessel.

14. The system of claim 3, wherein the software module is programmed with a proportional-integral-derivative control loop (PID) for continuously capturing data related to the difference between the commanded roll angle and the measured roll angle.

15. The system of claim 1, wherein the software module is configured to apply a correction on the delta position generated between at least one water engagement device on the port side and at least one water engagement device on the starboard side of the marine vessel.

16. The system of claim 1, further comprising a distribution module located near the transom of the vessel; and wherein the distribution module is further connected to at least one water engagement device actuator via at least one power and communication cable.

17. A dynamic active control system for a marine vessel, comprising:

a software module including an embedded microprocessor-based control system, a multi-axis rate sensor and a steering position sensor;

a pair of controllers, each including an actuator, a water engagement element connected to the actuator, and a position sensor operatively connected to the actuator, wherein each controller is communicatively and operatively connected to the software module;

wherein the control system determines an asymmetric controller deployment in response to a dynamic roll axis motion measured by the rate sensor as a result of a change in an output from the steering position sensor and as a result of environmental forces acting upon the marine vessel;

wherein the control system determines a relationship between the output from the steering position sensor and the asymmetric controller deployment; and

wherein the control system automatically commands changes to the asymmetric controller deployment to counter the dynamic roll axis motion resulting from the change in the output from the steering position sensor.

18. The system of claim 17, wherein the automatic asymmetric controller has a deployment speed of 100 mm/s or more.

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