CLAIMS

1. A hydrographic surveying vessel comprising:

a hull;

a marine manoeuvring system comprising:

a plurality of manoeuvring elements; and

an elongate element that extends between a first end body and a second end body of the marine manoeuvring system;

an acoustic wave generator; and

an acoustic wave generator controller that is configured to communicate with the acoustic wave generator, thereby enabling the acoustic wave generator controller to control the acoustic wave generator, the acoustic wave generator controller being housed within the hull;

wherein:

a first end portion of the marine manoeuvring system is configured to be connected to the hull; and

a second end portion of the marine manoeuvring system is configured to be connected to the acoustic wave generator, the second end portion of the marine manoeuvring system being further away from the hull than the first end portion when the marine manoeuvring system is connected to the hull;

the marine manoeuvring system defines a channel that is configured to receive one or more cables, the one or more cables enabling transmission of power and/or data between the acoustic wave generator controller and the acoustic wave generator;

the elongate element defines at least part of the channel; and

the elongate element is closer to a trailing end of the marine manoeuvring system than each of the manoeuvring elements.

2. The hydrographic surveying vessel of claim 1, further comprising at least one of:

a sensing system, the sensing system comprising:

a motion reference unit that is configured to generate motion data, the motion data being time series data indicative of a roll angle, a pitch angle and a heave angle of the hydrographic surveying vessel; and

a Global Navigation Satellite System (GNSS) module configured to generate GNSS data that is indicative of a heading, a latitude and a longitude of the hydrographic surveying vessel;

a network interface that is configured to enable communication between the hydrographic surveying vessel and another computing device;

a power system, at least part of the power system being housed within the hull; and

one or more cables, wherein the acoustic wave generator controller communicates with the acoustic wave generator using the one or more cables.

3. The hydrographic surveying vessel of claim 1 or claim 2, wherein:

the first end body defines at least part of a first end of the marine manoeuvring system;

the second end body defines at least part of a second end of the marine manoeuvring system; and

one or more of the manoeuvring elements:

extends from a first manoeuvring element end to a second manoeuvring element end;

is connected to the first end body at the first manoeuvring element end; and

is connected to the second end body at the second manoeuvring element end.

4. The hydrographic surveying vessel of any one of claims 1 to 3, wherein one or more of the manoeuvring elements extends orthogonally with respect to an inner surface of the first end body and an inner surface of the second end body.

5. The hydrographic surveying vessel of any one of claims 1 to 4, wherein the manoeuvring elements are vanes that are configured to influence a heading of the hydrographic surveying vessel in a fluid.

6. The hydrographic surveying vessel of any one of claims 1 to 5, wherein:

the first end body comprises a hull connecting portion that is configured to enable the hull to be connected to the first end body; and/or

the second end body comprises an acoustic wave generator connecting portion that is configured to enable the acoustic wave generator to be connected to the second end body.

7. The hydrographic surveying vessel of any one of claims 1 to 6, wherein:

the acoustic wave generator is disposed on an opposite side of the second end body to the manoeuvring elements; and/or

the acoustic wave generator is disposed on an opposite side of the manoeuvring elements to the hull, when the hull is connected to the marine manoeuvring system.

8. The hydrographic surveying vessel of any one of claims 1 to 7, wherein one of the manoeuvring elements defines at least part of a channel of the hydrographic surveying vessel, the part of the channel defined by the manoeuvring element extending from a first manoeuvring element end of the manoeuvring element to a second manoeuvring element end of the manoeuvring element.

9. The hydrographic surveying vessel of any one of claims 1 to 8, wherein:

the first end body defines a first part of the channel, the first part of the channel extending from a first end face of the first end body to a second end face of the first end body;

the part of the channel that is defined by the manoeuvring element is an intermediate part of the channel; and/or

the second end body defines a second part of the channel, the second part of the channel extending from a first end face of the second end body to a second end face of the second end body.

10. The hydrographic surveying vessel of any one of claims 1 to 9, wherein the plurality of manoeuvring elements comprises:

a fixed manoeuvring element; and

a movable manoeuvring element.

11. The hydrographic surveying vessel of claim 10, when dependent on claim 8, wherein:

the fixed manoeuvring element defines an intermediate part of the channel; and

the intermediate part of the channel extends from a first manoeuvring element end of the fixed manoeuvring element to a second manoeuvring element end of the fixed manoeuvring element.

12. The hydrographic surveying vessel of any one of claims 1 to 8, wherein:

the first end body defines a first part of the channel, the first part of the channel extending from a first end face of the first end body to a second end face of the first end body;

the elongate element defines a second part of the channel, the second part of the channel extending along the length of the elongate element;

the second end body defines a third part of the channel, the third part of the channel extending from a first end face of the second end body to a second end face of the second end body; and

the first part of the channel, the second part of the channel and the third part of the channel are coaxial.

13. The hydrographic surveying vessel of any one of claims 1 to 12, wherein:

the elongate element is closer to a trailing end of the marine manoeuvring system than a leading end of the marine manoeuvring system; and/or

the elongate element is laterally offset with respect to a rearmost manoeuvring element.

14. The hydrographic surveying vessel of any one of claims 1 to 13, wherein:

the acoustic wave generator is closer to a leading end of the marine manoeuvring system than a trailing end of the marine manoeuvring system; and/or

the acoustic wave generator is mounted to a leading quarter of the marine manoeuvring system.

15. The hydrographic surveying vessel of any one of claims 1 to 14, wherein the housing comprises a cable gland that is configured to:

enable a cable to pass from outside the housing into the housing; and

inhibit water ingress.

16. The hydrographic surveying vessel of any one of claims 1 to 15, further comprising at least one of:

one or more vessel tow mounting portions, each vessel tow mounting portion being configured to enable connection of a connector element; and

a towing connector assembly, the towing connector assembly comprising:

a towing connector comprising a plurality of towing connector mounting portions; and

a plurality of connector elements;

wherein:

one or more of the connector elements is configured to be connected to one of the towing connector mounting portions at one end; and

one or more of the connector elements are configured to be connected to one of the vessel tow mounting portions at another end.

17. The hydrographic surveying vessel of any one of claims 1 to 16, wherein the acoustic wave generator comprises a multibeam echosounder.

18. A hydrographic surveying system comprising:

the hydrographic surveying vessel of any one of claims 1 to 17;

a second hydrographic surveying vessel; and

a towing system that is configured to connect to the hydrographic surveying vessel and the second hydrographic surveying vessel, thereby operably linking the hydrographic surveying vessel and the second hydrographic surveying vessel.

19. The hydrographic surveying system of claim 18, wherein:

the second hydrographic surveying vessel comprises:

a second hull;

a second marine manoeuvring system;

a second acoustic wave generator; and

a second towing connector assembly, the second towing connector assembly comprising:

a second towing connector comprising a plurality of second towing connector mounting portions; and

a plurality of second connector elements;

a first end of the second marine manoeuvring system is configured to be connected to the second hull;

a second end of the second marine manoeuvring system is configured to be connected to the second acoustic wave generator, the second end of the second marine manoeuvring system being further away from the second hull than the first end when the second marine manoeuvring system is connected to the second hull;

each second connector element is configured to be connected to one of the second towing connector mounting portions at one end; and

one or more of the second connector elements are configured to be connected to a respective second vessel tow mounting portion of the second hydrographic surveying vessel at another end;

the marine manoeuvring system is configured to bias the hydrographic surveying vessel in a first direction in response to movement through a fluid in a movement direction; and

the second marine manoeuvring system is configured to bias the second hydrographic surveying vessel in a second direction in response to movement through the fluid in the movement direction, the first direction being different to the second direction.

20. The hydrographic surveying system of claim 18 or claim 19, when dependent on claim 16 wherein the towing system comprises:

a first towing element that is configured to be operably connected to the towing connector;

a second towing element that is configured to be operably connected to the second towing connector; and

a third towing element that is configured to be operably connected to the hydrographic surveying vessel at one end and the second hydrographic surveying vessel at another end, such that relative movement between the hydrographic surveying vessel and the second hydrographic surveying vessel is constrained.