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[54] APPARATUS AND METHOD FOR MANIPULATING A BODY IN A FLUID

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[57] ABSTRACT

[73] Assignee: The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Apparatus for testing hydrodynamic performance characteristics of an object is operative for remotely manipulating the object using standing acoustic wave fields. The object is provided with a plurality of internal solid bodies, each having a region of ordered voids. The object is placed in a fluid flow tunnel, and standing wave fields are propagated through the fluid by means of transducers mounted on the walls of the tunnel. The wave fields align the ordered voids in the solid bodies, and the alignment forces are transmitted to the bodies resulting in movement of the object. Matching pairs of transducers can be employed to create movement in roll, pitch, and yaw directions. Once a static position of the object is established by adjusting the power levels of the various transducers, movement of the object is accomplished by introducing ordered frequency shifts into the wave fields, or by physically moving the positions of the transducers relative to the object. Drag measurements can be calculated from the different transducer power levels required to maintain a static position of the object under varying fluid flow conditions and object orientations.

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[58] Field of Search 73/570.5; 148; 73/147; 181/0.5

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24 Claims, 12 Drawing Sheets

