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**92-09702**



April 6, 1992

Dr. Edwin P. Rood  
 Office of Naval Research  
 Code 1132F  
 800 North Quincy Street  
 Arlington, Virginia 22217-5000

**DTIC**  
**ELECTR**  
 MAY 4 1992  
**S C D**

Re: Quarterly Report: On Predicting the Drift of Person-in-Water for Search and Rescue,  
 (ONR Grant No. N 00014-91-J-1420)

Dear Dr. Rood:

During the three-month period ending March 31, 1992, we focused on three topics of interest:

(1) Establishing the wind drag coefficient and current drag coefficient of Person-In-Water model through water channel test. A three component force balance was used to measure forces. Velocity, angular dependence, effect of depth of floatation and clothing were established. A preliminary report was prepared which summarized the test result.

(2) Investigation of accumulating effect of upstream disturbance on flow in the region of flow stagnation continues. We focus on observing in the water channel the possible accumulation of vorticity cause from the free surface upstream in front of a partially submerged square plate which is placed normally to the in-coming flow. It is found that a strong and stable quasi-periodic vortex structure can be established through vortex accumulation in the forward stagnation zone of the plate. The vortex extends along the free surface to the downstream like a horse shoe vortex. The visualization is based on the hydrogen bubble technique and the vortex also accumulates the hydrogen bubbles to its core making the vortex core easily visible. It is also found that along the vortex the free surface is elevated to form a vortex-induced standing "bow" wave. During the period when the vortex is stable, the wave is also stable. During the brief period when the vortex breaks away and the waves also break away. Meanwhile, tiny water droplets jump out of the water surface. We plan to further explore these findings and aim to submit a paper by July 1992. A paper describing the earlier finding without the ingredient

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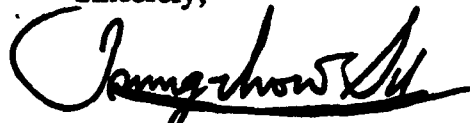
Letter to Dr. Edwin P. Rood dated April 6, 1992 - Page 2

of free-surface is being prepared for a JFM submission. Also submitted during this reporting period is a paper entitled, "The transverse vortex in the wall regions of the turbulent boundary layers in the flows with adverse pressure gradient" to JFM. Both papers in its summary form were submitted in February, 1992 for publication at the Proceedings, ASCE Engineering Mechanics Conference, May 24-27, 1992 in College Station, Texas.

(3) Field Test Planning -- We are making preliminary field test plans to verify the predicted floating body drift. We are considering test sites along the Florida Keys. During the last few months, we focused on improving drifter design for surface current measurement. A theory was developed on the dynamics of drifter in wind, current and wave environments. An improved design was created and was testing the water channel using a 1/10 scale model. Two graduate assistants, Mr. Bob Milo of Electrical Engineering and Mr. Ashok Rajan of Computer Engineering, were recruited to assist laboratory and field-test. We are aiming a significantly improving drifter design, incorporating the understanding of hydrodynamics of stagnation flow and on board sensor feed back, to achieve higher orders of magnitude reduction both in weight and measuring error. Immediate goal is to facilitate the project field test. Long term goal is to develop a new technology which we believe will be a very important tool in conjunction with remote sensing technique in the study of large scale oceanic flow.

Thank you very much for your attention and support.

Sincerely,



Tsung-chow Su, Professor

TCS:cam

cc: Administrative Grants Officer (1 copy)  
Director, Naval Research Lab. (1 copy)  
Defense Technical Information Center (2 copies)  
Mr. R. Q. Robe, U.S. Coast Guard R&D Center (2 copies)



Statement A per telecon  
Dr. Edwin Rood ONR/Code 1132  
Alington, VA 22217-5000

NWW 5/1/92

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