

Abstract Submitted
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Optical sensor for detection of supercavity-body contact location¹

JESSE BELDEN, MICHAEL JANDRON, Naval Undersea Warfare Center, TADD TRUSCOTT, Brigham Young University — Supercavitating vehicles have been the subject of intense research due to the potential for drag reduction and/or increased speeds. The control of such vehicles depends on accurate knowledge of planing forces generated by partial, transient wetting of afterbody surfaces. Measurement of the supercavity-body contact location, which determines the planing area, is thus critical for vehicle control. A robust sensor capable of measuring supercavity contact location along the length of a body is presented. The sensor operates on the optical principle of total internal reflection to differentiate between liquid and gas phases in contact with the body. An array of photodetectors is used to sense the presence or absence of light from a laser source to map the contact location. The theoretical operation and limitations of the sensor are discussed and several experiments are presented to validate the theory. Also, we present an elegant signal processing method to compensate for *in situ* changes in ambient light conditions.

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