

A Focused, High-Intensity Spread-Spectrum Ultrasound Solution to Prevent Biofouling

Authors : Alan T. Sassler

Abstract : Biofouling is a significant issue for ships, especially those based in warm water ports. Biofouling damages hull coatings, degrades platform hydrodynamics, blocks cooling water intakes, and returns, reduces platform range and speed, and increases fuel consumption. Although platforms are protected to some degree by antifouling paints, these paints are much less effective on stationary platforms, and problematic biofouling can occur on antifouling paint-protected stationary platforms in some environments in as little as a matter of weeks. Remediation hull cleaning operations are possible, but they are very expensive, sometimes result in damage to the vessel's paint or hull and are generally not completely effective. Ultrasound with sufficient intensity focused on specific frequency ranges can be used to prevent the growth of biofouling organisms. The use of ultrasound to prevent biofouling isn't new, but systems to date have focused on protecting platforms by shaking the hull using internally mounted transducers similar to those used in ultrasonic cleaning machines. While potentially effective, this methodology doesn't scale well to large platforms, and there are significant costs associated with installing and maintaining these systems, which dwarf the initial purchase price. An alternative approach has been developed, which uses highly directional pier-mounted transducers to project high-intensity spread-spectrum ultrasonic energy into the water column focused near the surface. This focused energy has been shown to prevent biofouling at ranges of up to 50 meters from the source. Spreading the energy out over a multi-kilohertz band makes the system both more effective and more environmentally friendly. This system has been shown to be both effective and inexpensive in small-scale testing and is now being characterized on a larger scale in selected marinas. To date, test results have been collected in Florida marinas suggesting that this approach can be used to keep ensonified areas of thousands of square meters free from biofouling, although care must be taken to minimize shaded areas.

Keywords : biofouling, ultrasonic, environmentally friendly antifoulant, marine protection, antifouling

Conference Title : ICMTO 2024 : International Conference on Marine Technology and Operations

Conference Location : Zurich, Switzerland

Conference Dates : July 29-30, 2024