Topic: N181-036

Makai Ocean Engineering, Inc.

Hydrodynamic Control of a Towed Vertical Array

Makai's SVACS system uses a series of thrusters along subsea vertical cables to actively adjust and control the shape of the cable to improve straightness and overcome drag. The drag on existing cables allow the cables to kite away from vertical. The targeted application for this system is subsea vertically cables. Makai Ocean Engineering (Makai) is well known for our work with subsea cabled systems including innovative software and hardware systems. Makai has completed a feasibility study and performed small scale testing to prove the system meets the Project’s requirements. We are looking for assistance in transitioning and integrating this technology into operational subsea vertical cable systems.

Technology Category Alignment:

Sensors
Ground and Sea Platforms
Advanced Electronics

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SYSCOM: NAVSEA
Contract: N68335-20-C-0122

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-20-C-0122

Tech Talk: https://www.youtube.com/watch?v=qlisr_2XlBE

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #

Topic # N181-036

Hydrodynamic Control of a Towed Vertical Array

Makai Ocean Engineering, Inc.

WHO

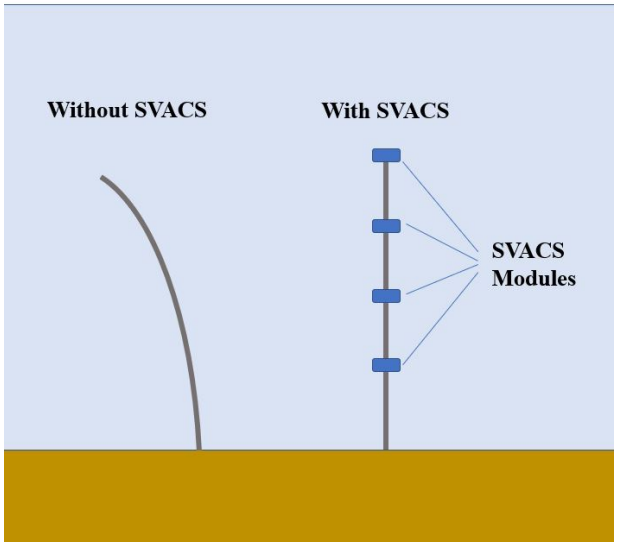
SYSCOM: NAVSEA

Sponsoring Program:

Transition Target: Anything requiring a cable to remain vertical in the water column

TPOC:
(858) 537-0112

Other transition opportunities: Other transition opportunities include all applications that use cables that should maintain verticality in the water column



WHAT

Operational Need and Improvement: There exists a need to straighten vertical cables within the water column. Vertical subsea cables are currently able to kite away from vertical in the water due to drag. Maintaining vertical orientation of the cable is required for some applications.

Specifications Required: A solution must be added to vertical subsea cables that autonomously and dynamically controls the cable in the vertical plane while deployed in the water, while not inducing turbulence or noise.

Technology Developed: Makai's SVACS system solves the issues of straightness, verticality and orientation without requiring expensive redesign of the subsea cables currently use and can be easily incorporated into existing and new systems.

The SVACS concept consists of thruster modules placed along the length of the cable arranged to provide forces capable of restoring the system to vertical and accurately controlling the cable's shape. The design includes sensors that relay information to the SVACS software controller that autonomously controls the thrusters. Cable shape estimation and control of the thruster modules is an important development aspect of the proposed SVACS technology. Makai has unparalleled experience in this field and we will seek to leverage our experience to provide a high fidelity turnkey hydrodynamic control system.

Warfighter Value: SVACS reduces the off vertical angle of the cables to less than 1 degree in water speeds up to a speed of 3.75 knots, and maintains straightness within one foot during water speeds up to 4.3 knots.

WHEN

Contract Number: N68335-20-C-0122 **Ending on:** June 12, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Single SVACS module built and tested in pier-side setting	Low	Sensors and controls hardware successfully control the module	5	December 2020
Pier-side trial of full SVACS prototype	Med	Full prototype SVACS works as designed in a simulated operational environment	6	March 2022
Full SVACS prototype tested on vertical subsea cable systems	Med	Full prototype SVACS works as expected on the vertical subsea cables	7	June 2022
Final non-prototype SVACS system tested on operational subsea cable systems(If technology continues to mature as expected and future R&D funding for technology is available)	Med	SVACS gets qualified and approved for use on operational subsea vertical cable systems	8	July 2023

HOW

Projected Business Model: After successful Phase II testing, Makai will work to integrate the SVACS solution into operational subsea vertical cable applications, including any design modifications necessary. Makai estimates that we could have units built and tested on operational cables in 12 months after Phase II is completed. If successful and fully accepted by the end users we would expect that 7-10 units would be incorporated on existing operational and spare cables over a period of several years. Makai will build and sell SVACS directly to our customers. Order volumes are expected to be limited, with orders in the tens of units total. Makai will use the trusted supply chain developed during PhII efforts to competitively source parts, assemble and calibrate equipment in-house, and deliver to the customers.

Company Objectives: While Makai is already known worldwide for our subsea cable modeling software, SVACS and other technologies currently being developed are allowing Makai to expand into cable related hardware systems.

Potential Commercial Applications: SVACS is limited in applications to those with subsea vertical cables, and does not have a direct commercial alternative. This program and the hardware design capabilities could be adapted for acoustic/seismic cable systems employed by oceanographic vessels, surveyors, and the offshore oil and gas exploration markets.

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