



MECHANICAL ENGINEERING STUDENT SEMINAR

Wednesday, September 20 2023 at 13:30, D. Dan and Betty Kahn Building, Room 217.

The Hydrostatic Buckling of SPM system of fish cages and a design method to prevent it

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The aquaculture industry in the open seas requires improvement of the marine structures, in order to function effectively in high sea environment. One promising concept of such an efficient solution is a flexible array of cages arranged in a row, free to rotate about a Single Point Mooring (SPM). The SPM arrangement of a row of cages minimizes the anchoring load by masking of the current applied to the downstream cages, hence saves anchors and mooring lines. However, a sudden reversal of the current direction presents a risk of buckling of the row of cages, if it applies a compression load along the array of cages before the rotation of the entire cage system takes place.

In this study, we present the concept of Hydrostatic Buckling of SPM cage systems and develop a method of design and analysis to control the stability of the system at the situation of sudden current reversal. First, we formulate a simple method for preliminarily assessment by applying the principle of virtual work. Then, we analyze the structure by a parametric finite elements code. We parametrically study the reversal current limits for the stability of the structure, by the analyses of two hypothetical practical scenarios, which we formulate.

This study presents practical design tools and results, such as the method of the analysis, simplified loading states for representing the critical events, the scantlings of the structure, as well as guidelines for designing a SPM system of cages that withstand critical situations of reversal current.

Note: the seminar will be given in Hebrew