Thesis Title	Mode Transition Behavior of Elastic Submerged Cables
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Abstract

In this thesis, the in-depth study on the effects of axial deformation and sag on the in-plane free vibration behavior of submerged cables is presented. The model formulation developed in this study is based on the virtual work-energy functional of the cable, which involves strain energy due to axial stretching and virtual work done due to other external forces. The equations of motion in cartesian coordinates are obtained by considering the difference between Euler's equations and equilibrium equations. The method of Galerkin finite element is used to obtain the mass and stiffness matrices which are transformed into Lagrangian coordinates and then the eigenvalue problem is solved using inverse iteration methods.

The results of parametric study demonstrate the phenomenon of frequency crossover and frequency avoidance which can be found in two characteristics of vibration, namely (1) catenary- string transition and (2) elastic mode transition. These phenomenon induce modal transition of free vibration and enlarge dynamic cable tension to its maximum value.

Keywords : Free Vibrations / Natural Frequencies / Dynamic Tensions / Submerged Cables / Frequency Crossover / Frequency Avoidance