

Department of Ocean and Resources Engineering

Seminar

Prediction of Cable Fatigue

by

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Abstract

Today, there are many marine applications that require sophisticated cables performing different functions. Tethered remotely operated vehicle (ROV) cables, power cables, mooring ropes, arresting cables and communication cables are a few examples of marine cables. These cables have components with complex helical geometries that require specialized analysis models to predict structural performance. Furthermore such cables often undergo fluctuating loads, tension as well as bending, during its design life. The determination of fatigue life of a cable acted upon by fluctuating tension and bending is a complex problem. An understanding of the nature of stresses in cable components and the endurance limit of its component materials is necessary.

In this presentation, a fatigue prediction model developed for cables will be described. This model treats the stress concentration between contacting wire surfaces as an equivalent notch, that is used to reduce the component wire endurance strength. Fluctuating tension loads and bending loads are considered. The bending fatigue loads can be either simple bending over a sheave or a completely reversed bending at a constant applied tension. The fatigue model predictions will be compared with results from fatigue tests conducted on two different cables with these load types.

Further experimental verification of this model is currently underway. These experiments involve bending fatigue of a tensioned wire rope by moving it back and forth over a sheave in a cable testing machine. These tests will provide as-built cable construction details and material properties. The experimental data thus obtained will be used to verify and improve the cable fatigue model.