National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Strengthening Underwater Pipeline Longevity and Reliability With ECTMD Technology: Vibration Control and Axial Displacement Suppression
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Venue	: ME Seminar Hall (ME-001)
Date and Time	: 24 Sep 2025 (03:30 PM)
Abstract	: Underwater pipelines are essential in various industries but face threats from dynamic stresses, which can lead to structural issues. This paper introduces the Eddy Current Tuned Mass Damper (ECTMD) as a solution, designed to dampen vibrations from factors like fluid flow and seismic activity while also addressing axial displacement, which can cause damage and increase maintenance costs. The ECTMD operates by adjusting its mass and damping properties to match the pipeline's resonance frequency, effectively reducing vibration amplitudes and stabilizing axial movement. The structure of the subsea pipeline has been modeled, and subsequently, the analysis has been carried out with CFX model in ANSYS®. It is observed that natural frequency depends inversely on fracture depth irrespective of ground support. Additionally, a frequency sensitivity analysis has suggested the effects of several parameters, such as the velocity ratio, have been studied in the subsea pipeline. The technology enhances the durability and reliability of submerged pipelines, making it a vital tool for extending their lifespan and operational performance.