The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

On

Modelling the Response of the Floating Ladder Track to a Moving Load

by

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Abstract

An infinite Bernoulli-Euler beam (representing the“combined rail”consisting of the rail and longitudinal sleeper) mounted on periodic flexible point supports(representing the railpads) has already proven to be a suitable mathematical model for the floating ladder track (FLT), to define its natural vibrations and forced response to a moving load. On adopting deliberately conservative parameters for the existing FLT design, significant results are obtained for the response to a steadily moving load when the periodic supports are assumed to be elastic, and then when the mass and viscous damping of the periodic supports are introduced. Typical support damping significantly moderates the steady state response at any load speed, and in particular substantially reduces the magnitude of the resonant response at the critical speed. The linear mathematical analysis is then extended to include the inertia of the load that otherwise moves steadily along the beam, generating overstability atsupercritical speeds — i.e. at load speeds above the critical speed predicted for theresonant response when the load inertia is neglected. Neither the resonance nor the overstability should prevent the safe implementation of the FLT design in modern high speed rail systems.

Date : October 25, 2012 (Thursday)
Time : 10:30 a.m. – 11:30 a.m.
Venue : HJ610, The Hong Kong Polytechnic University

*** * * ALL ARE WELCOME * * ***