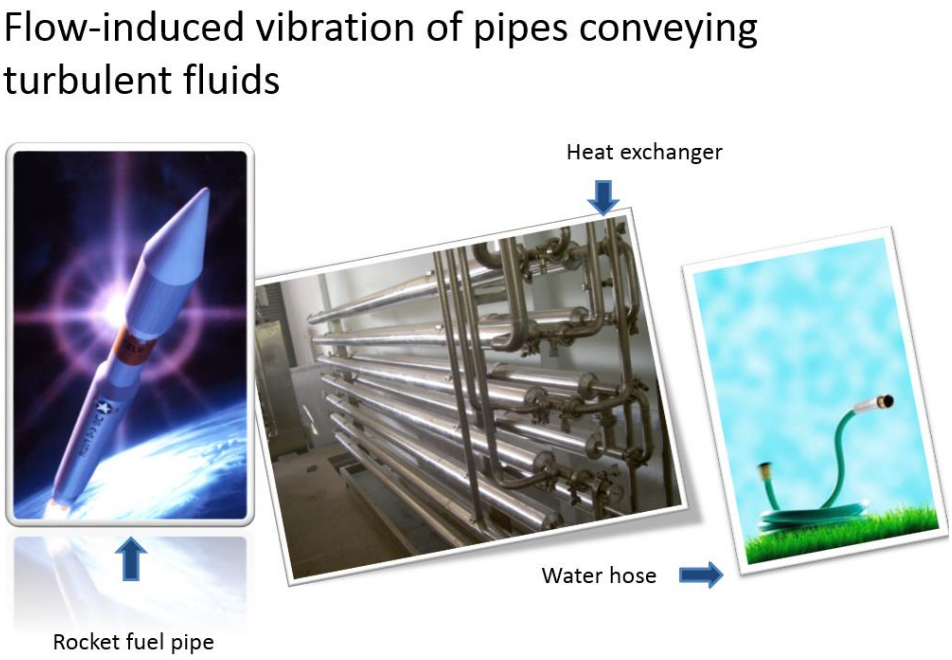
Responses of Complicated Piping Systems Containing Turbulent Fluids

Jointly Organized by The Hong Kong Institute of Acoustics,
the Department of Mechanical Engineering of Hong Kong Polytechnic University and
The Hong Kong Institution of Engineers - Mechanical, Marine, Naval Architecture & Chemical Division

Speaker: Prof. C.W.S. To
(University of Nebraska, Department of Mechanical & Material Engineering)
Venue: Room EF 312, The Hong Kong Polytechnic University, Hung Hom, Kowloon
Date & Time: 4 Aug 2015, from 18:30 to 20:00 (reception start at 18:15)

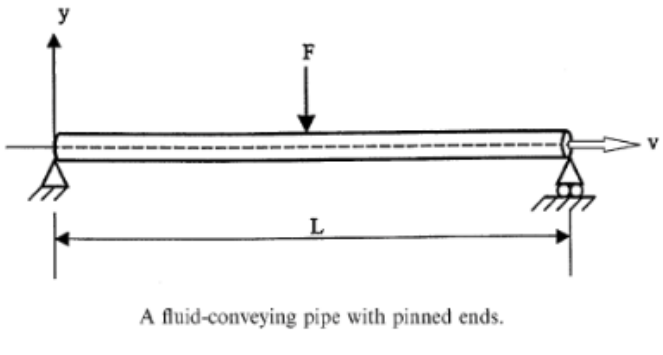


Programme Highlights:

Flow-induced vibration in complicated piping systems containing turbulent fluids is of particular interest because, for example, in aerospace engineering industries where delivery of large quantities of fuel in a comparatively short period of time is common. In nuclear power stations and facilities such piping systems or elements are also common. However, there is an urgent need to study the temporal response, such as the root-mean-square of vibration amplitudes and correlations of general shell structures subjected to turbulent axial flow. The investigation being reported is a modest response to the challenge of providing techniques for the analysis and design of complicated piping systems containing turbulent

fluids and under external random excitations. An approach has been developed in the investigation. It combines the use of the finite element method (FEM) and the simple, accurate, and efficient stochastic central difference (SCD) method originally developed by Prof. C.W.S. To in the middle of 1980's. The present approach treats the turbulent fluids as random processes.

In this seminar, cantilevered pipes (Fig.1) containing a turbulent flow with base random excitation are considered. Experimental and Monte Carlo simulation (MCS) results are compared with those obtained by the proposed approach. It is concluded that the approach is accurate, simple and efficient to employ (Fig.2). Owing to the fact that it applies the FEM it can be readily generalized to include systems having geometric and material nonlinearities.



A fluid-conveying pipe with pinned ends.

Fig. 1: Fluid-conveying pipe with pained ends

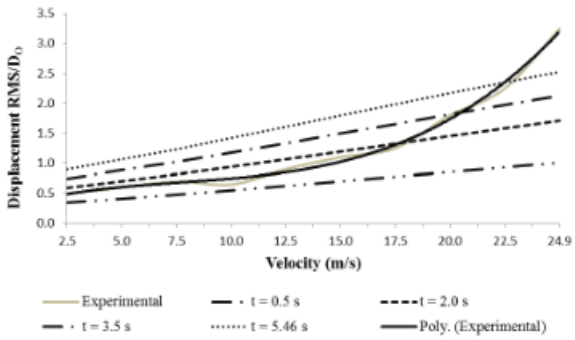


Fig. 2: Experimental and MCS result comparison

Registration

For registration, please fill in and submit the form by 31 July 2015 at the following website. http://www.wal.hk/hkioa/complicated_piping_systems_responses.html. The seminar is free of charge for all members of HKIOA, HKIE and PolyU students in first-come first-served basis. (HKD$100 will be charged for non-members)

Wilson HO
Chairman, Activities Sub-committee of HKIOA