HIGH PERFORMANCE COMPUTAIONAL TECHNOLOGIES FOR WAVE PROPAGATION IN ANISOTROPIC MEDIA

Codes Developed

- SAM Analysis of dispersion and characteristic surfaces of waves in fluid-loaded laminated anisotropic plates and shells
- SEM Analysis of wave scattering by defects in fluid-loaded laminated anistropic plates and shells

Application

- Non-destructive evaluation of defects in underwater anistropic plates and shells.

High performance technology refers to one that can be used to solve practical engineering problems with high accuracy and less computational labour and CPU time. Unlike isotropic cases, wave propagation in laminated anisotropic media is complicated by both dispersion and anisotropy of waves. In addition, defects could occur in these structures as a result of composite manufacturing or through in-service using. In ultrasonics, a fluid is also usually used as a coupling media between composite specimen and tranducer. The defect effect and the fluid-structural coupling effect make analysis more difficult. As such, this type of problem is not amenable to conventional methods of analysis. However, numerical methods, such as finite element method and boundary element method need considerably high computational labour and are time-consuming in the treatment of such problems. This project attempts to develop expedient computational techniques for analysing wave propagation comprehensively in fluid-loaded laminated anisotropic plates and shells. Extensive parametric studies have been made.

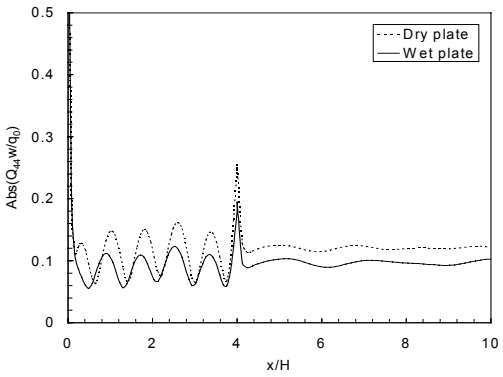

Fig. 2 Surface displacement of fluid-loaded composite plate with surface-breaking cracks.

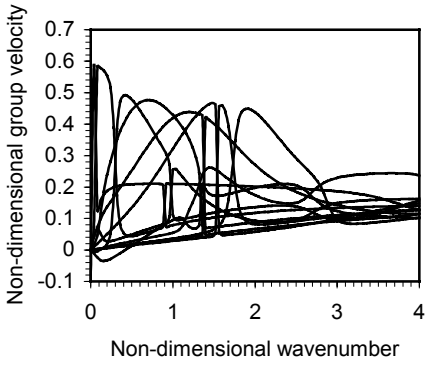

Fig. 1 Group velocity spectra for a composite cylinder.

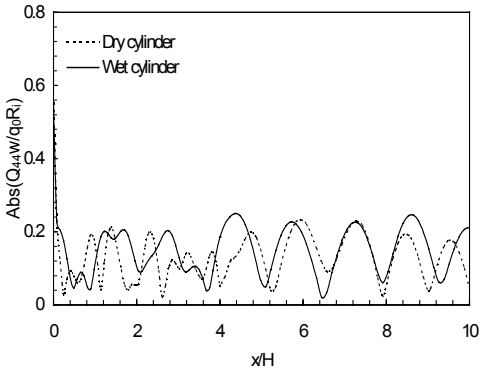

Fig. 3 Surface displacement of a fluid-loaded composite cylinder with an interior radial crack.