臺灣大學數學系演講

Inverse Problems Seminar

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講　題：Water wave problems using null-field integral equations: ill-posedness and treatment

時　間：2011年10月5日 (星期三) 14:20~15:10

地　點：臺灣大學天文數學館 305 室

摘　要：Scattering of water waves by an array of circular and/or elliptical cylinders is solved by using null-field boundary integral equations in conjunction with degenerate kernels. Both the near-trapped modes (physics) and fictitious frequencies (mathematics) are observed. To alleviate the ill-posed matrice of fictitious frequency for multiple cylinders, two remedies, Combined Helmholtz Interior integral Equation Formulation (CHIEF) approach and Burton and Miller formulation are considered. Regarding the Burton and Miller approach, hypersingular integrals can be easily calculated by using series summability owing to the introduction of degenerate kernel. The highly rank-deficient matrices for equal radius of cylinders are numerically examined and the rank is improved by adding valid CHIEF constraints. Besides, the selection of location and number for CHIEF points is studied instead of trial and error. Parameter study of incident angle on the resultant force is investigated. The effect of geometric scale for spacing and radius of cylinder on the near-trapped mode and fictitious frequency is also discussed. Several examples of water wave interaction by circular and/or elliptical cylinders were demonstrated to see the validity of the present formulation.

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