 ICCES, vol.19, no.1, pp.15-15

Progress in improving computational efficiency of MLPG_R method for nonlinear water waves

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Summary

Over the past several years, the research group led by the author has extended the MPLG (Meshless Local Petrov-Galerkin) method developed by Prof. Atluri and his group to model nonlinear water waves; and then made further development to produce a method called MLPG_R (Meshless Local Petrov-Galerkin method based on Rankine source solution) method. In order to improve the computational efficiency of the method for modelling nonlinear water waves, several techniques have been developed. They include (1) introduction of a weak form of governing equation that does not contain derivatives of unknown functions; (2) a new meshless interpolation method of a function and gradient; (3) a semi-analytical technique for numerical computation of integrals over sub-domains (2D and 3D); and (4) a semi-analytical technique for numerical computation of integrals over sub-domain surfaces (2D and 3D).

This presentation will discuss the various features and their effects of the techniques.