From meshfree PIM to smoothed PIM (S-PIM) and smoothed FEM

(S-FEM): an overview on the development of meshfree methods at ACES

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Abstract

This work presents an overview of the development of meshfree methods originated from Prof. G. R. Liu's group, which are mostly based on the work conducted at the Centre for Advanced Computations in Engineering Science (ACES). Consider numerous meshfree methods developed, the point interpolation method (PIM) can be regarded as the key to the main development direction. From 90s of last century to nowadays, so called meshfree PIM has been successfully developed to smoothed PIM (S-PIM) and smoothed FEM by using the generalized gradient smoothing operation in the schemes of meshfree and FEM, respectively. In theory, the new G Space theory and weakened weak (W²) formulation have been developed for the smoothed methods. Owing to the softened and even close-to-exact stiffness, the smoothed methods possess a number of very good and practical properties and have also been applied to solve various problems of engineering and science.