Three-dimensional meso-scale modelling of concrete using a finite element-scaled boundary finite element coupled method

***Yujie Huang[1], †Zhenjun Yang[1], Guohua Liu[1]**

[1]College of Civil Engineering and Architecture, Zhejiang University, 310058, China.

*Presenting author: mpcyujie@126.com

†Corresponding author: zhjyang@zju.edu.cn

Abstract

This study develops a method coupling the finite element method (FEM) and the scaled boundary finite element method (SBFEM) for three-dimensional meso-scale modelling of concrete. In this method, the material heterogeneity is characterised by randomly generated polyhedral aggregates. The mortar matrix is modelled by FEM while the aggregates are modelled by SBFE polyhedrons with boundary surfaces discretised only. The linear elastic analysis is carried out using the developed method. The result demonstrates the coupled method leads to significant reductions in degrees of freedom and computational time against conventional FEM.

Keywords: Finite element method, Scaled boundary finite element method, Meso-scale modelling of concrete