ABSTRACT

A numerical method of analysis is proposed for response analysis of raft foundations using FE - BE coupling technique. The structural model adopted for the raft, is based on an isoparametric plate bending finite element and the raft-soil interface is idealised by boundary elements. Mindlin's solution for a point load in half-space is used as fundamental solution to find the soil flexibility matrix and consequently the soil stiffness matrix. Transformations of boundary element matrices are carried out to make it compatible for coupling with plate stiffness matrix obtained from the finite element method. This method is very efficient and attractive in the sense that it can be used for rafts of any geometry in terms of thickness as well as shape and loading. Effect of depth of embedment on response is also studied. Responses of different types of raft foundations are obtained under static loading. Free vibration analysis of various types of raft foundations is carried out by using the developed computer programme. Responses of square and circular rafts under different types of transient and seismic excitation are also obtained.

Keywords: Elastic half-space, raft foundation, boundary element method, finite element method, coupling, relative stiffness parameter, response, transient loading, natural frequency, seismic excitation