VIBRATION ANALYSIS OF FRAME STRUCTURE EXCITED WITH RAYLEIGH WAVES USING SPECTRAL ELEMENTS

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Abstract: The spectral element method has advantage compared to other numerical methods in possibility to describe the structural model with minimum number of elements, and in dynamic analysis in frequency domain which enables taking into account foundation soil influence through impedance functions. Scope of the research is theory and application of spectral elements to frame structures, also deep beams, considering soil-structure interaction effects. Special attention is dedicated to the spectral elements based on Timoshenko's beam theory, which means that shear deformation is taken into account in vibration analysis. Special program in Matlab v.7.0.1. has been developed to calculate structural response on earthquake load, traffic load (Rayleigh waves) and other types of dynamical excitations in domain of mathematical model of structure (wind, machines, explosions) an outside. Objective is to obtain results of high accuracy in dynamic loading influence estimation on structure founded on soil of various characteristics.

Key words: Spectral element method, Euler-Bernoulli beam, Timoshenko beam, soil-structure interaction, impedance functions, Rayleigh waves.

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