Effects of seismic actions in offshore areas using the boundary element method

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Abstract

We study the seismic pressures in offshore areas considering the effect of seabed configurations and soil materials. To irradiate waves the Boundary Element Method is used, so the force densities can be obtained for each boundary element. The diffracted waves are constructed at the boundary from which they are radiated so the Huygen's Principle is implemented. Applying the boundary conditions a system of integral equations of the Fredholm type of second kind and zero order is obtained. Integral equations are used to study the effects of seismic actions in offshore and onshore areas. Various models of the seabed are analyzed and pressure fields are obtained in frequency and time domain.

It was found that soil materials with high wave propagation velocities generate low-pressure fields. The difference between the maximum pressure values obtained for a soil material with shear wave velocity of $\beta = 3000$ m/s is approximately 9 times lower than those obtained for a material with $\beta = 90$ m/s, for the P-wave incidence, and 2.5 times for the case of SV-waves. We observed that the highest seismic wave pressure due to an offshore earthquake is usually located at the seafloor.

Keywords: **Seismic pressures, elastic waves, seaquake, Boundary Element Method.**