Abstract

Mohamed N El-Shaib

Reliability of fixed offshore jacket platform against earthquake collapse

In this study, an approach for the reliability assessment of a fixed offshore jacket platform against earthquake collapse is presented. The platform is modelled using a nonlinear finite-element model taking into account the effect of pile–soil interaction. The platform ultimate base shear resistance is first computed by using a nonlinear progressive collapse analysis and used as a resistance variable for reliability assessment. The seismic-induced dynamic base shear, acting on the platform base, due to seismic loads is then computed. The probability of platform collapse under seismic loading is computed using a finite-element reliability code. The first-order/second-order reliability methods are used for computation of safety indices. These values are then compared with target safety levels as set in offshore platform design codes. A case study for a fixed jacket platform located in the Gulf of Suez offshore of Egypt is analysed using the proposed approach. Results show that computed safety levels are within the target values. The proposed approach can be a valuable tool for platform designers/operators for assessment of platform safety and reliability in seismically active areas.