



Impacts of earthquake on atoll in Nansha Islands, South China Sea

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Coral reef is a kind of rock soil masses. It is a special marine geotechnical medium, which are made up of the reef coral debris undergo very long geological age. Atoll is the predominant type of coral reefs in South China Sea. In recent years, there are more and more construction projects on the reef flat in Nansha Islands, South China Sea. Therefore, it is very important to estimate the stability of coral reefs, especially the atolls. According to the geological structure characters of atoll in Nansha Islands, a model of reef body is presented in this paper to study the influence of earthquake. Meanwhile, Geostudio, which is a popular geotechnical engineering simulation software, is used to stimulate the stress and deformation situation of reef body under different six kinds of earthquake intensity. The factor of safety can be calculated by the limit equilibrium method. And the possible scenario of earthquake-induced landslides and sliding scale can be defined through the Newmark sliding block method. The stress distribution and deformation behavior are studied. The main relations between atoll and earthquake are analyzed as follows: (1) the safety factor of reef slope exceeds 1.993 under self-gravity state; (2) It may cause slope's instability and bring slumping when the safety factor is less than one. The factor of safety decreases with increased earthquake intensity and it may fluctuate around a particular value when earthquake intensity continues to increase; (3) The smaller shallow landslide as new developed part of the reef is subject to collapse under earthquake action and the bigger slope of reef is more stable. The results show that it is feasible to evaluate the stability of coral reef by using geotechnical engineering simulation method, which can help to provide some information for construction on coral reefs in South China Sea.

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