SM20L_11667

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Modeling of Static Liquefaction and Evolving Failure Modes

Nathalie Boukpeti[(1)], Andrew Drescher[(2)]

(1) *University of Liege, Liege, Belgium*
(2) *University of Minnesota, Minneapolis, USA*

Considered are the elasto-plastic and a new elasto-viscoplastic version of the Superior sand model for describing static liquefaction of water-saturated, loosely-packed granular deposits. The response of the model to undrained triaxial compression in strain- and stress-controlled loading as well as to creep is analyzed. The limit points at which static liquefaction identified with the loss of stability of the model are discussed. It is shown that the classical second-order work rate instability criterion valid for elasto-plastic models no longer applies to the rate-dependent version of the model; instability is governed by the first-order work acceleration. Examples of numerical simulations of the undrained plane-strain biaxial compression test using the model demonstrate the effect of the rate of loading and internal flow on the formation of shear bands. Also, the effect of the mass of the specimen and of the loading system on the post-stability response is discussed.

View the extended summary