ABSTRACT

A non-linear, three-dimensional finite element analysis of footwear and ground interaction based upon the Drucker-Prager elastic-perfectly plastic material model was investigated. In contrast with the problem between hard surfaces and outer-sole of boot, which can be simply modelled using Coulomb friction mechanism, this study was aimed at how plastic failure of soil mass develop between the rigid boot outer-sole (cleats) and soft soil surfaces. A brief review of the mathematical theory of elastic-perfectly plastic material model and the computational procedure used in the finite element program was presented. The solid interaction model between rigid outer-sole of boot with typical tread patterns and soft soil surfaces has been constructed, modified and analysed in ANSYS finite element code. Results show that a better design for treat patterns can be achieved to reduce footwear failure.