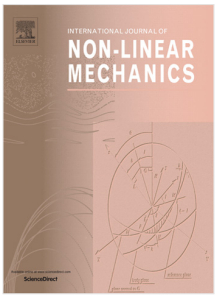
Accepted Manuscript



A unified constitutive model for simulating stress-path dependency of sandy and gravelly soil-structure interfaces

Miad Saberi, Charles-Darwin Annan, Jean Marie Konrad

PII: S0020-7462(17)30680-7
DOI: https://doi.org/10.1016/j.ijnonlinmec.2018.03.001
Reference: NLM 2985

To appear in: *International Journal of Non-Linear Mechanics*

Received date : 3 October 2017
Revised date : 3 March 2018
Accepted date : 5 March 2018

Please cite this article as: M. Saberi, C.-D. Annan, J.M. Konrad, A unified constitutive model for simulating stress-path dependency of sandy and gravelly soil-structure interfaces, *International Journal of Non-Linear Mechanics* (2018), https://doi.org/10.1016/j.ijnonlinmec.2018.03.001

A Unified Constitutive Model for Simulating Stress-Path Dependency of Sandy and Gravelly Soil-Structure Interfaces

Miad Saberi[1*], Charles-Darwin Annan[1], Jean Marie Konrad[1]

[1]Department of Civil and Water Engineering, Université Laval, Québec, Canada

Abstract: A plasticity constitutive model is proposed to simulate the monotonic and cyclic behavior of granular soil-structure interfaces. The model is built on two-surface plasticity models previously developed for interfaces between gravelly soils and structural materials [1,2], which simulate strain hardening, stress degradation and phase transformation behavior. The proposed model in this study incorporates the softening behavior likely to occur in dense sandy soil-structure interfaces under monotonic and cyclic loading, and it provides a unified formulation for simulating the behavior of both sandy and gravelly soil-structure interfaces. The model accounts for the stress path dependency behavior of interfaces, and it requires a single set of nine calibration parameters, which can readily be obtained from standard interface shear tests. The interface model's performance is evaluated for Constant Normal Load, Constant Normal Stiffness, and Constant Normal Height stress path conditions by comparing its predictions with experimental data.

Keywords: sandy and gravelly soil-structure interface, unified formulation, two-surface plasticity, critical state soil mechanics

1. Introduction

[*] Corresponding author: Miad Saberi, Department of Civil and Water Engineering, Université Laval, Québec, Canada
E-mail : miad.saberi.1@ulaval.ca