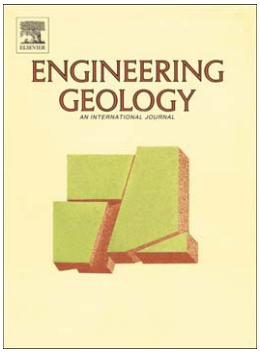

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Assessment of soil liquefaction based on capacity energy concept and multivariate adaptive regression splines

Wengang Zhang[1]， Anthony. T. C. Goh[2*], Yanmei Zhang[3], Yumin Chen[4], Yang Xiao[5]

[1]Research Fellow, School of Civil and Environmental Engineering, Nanyang Technological University, Singapore. Email: zhangwg@ntu.edu.sg

[2*]Associate Professor, School of Civil and Environmental Engineering, Nanyang Technological University, Singapore. Email: ctcgoh@ntu.edu.sg

[3]Graduate Student, DHI-NTU, Nanyang Environmental and Water Research Institute, Interdisciplinary Graduate School, Nanyang Technological University, Singapore. Email: yzhang051@e.ntu.edu.sg

[4]Associate Professor, College of Civil and Transportation Engineering, Hohai University, Nanjing, China. E-mail: ymchenhhu@163.com

[5]Associate Professor, College of Civil Engineering, Chongqing University, Chongqing, China. E-mail: hhuxyanson@163.com

ABSTRACT:

Soil liquefaction is one of the most complicated phenomena to assess in geotechnical earthquake engineering. The procedures that have been developed to determine the liquefaction potential of sandy soil deposits can be categorized into three main groups: stress-based, strain-based, and energy-based procedures. The main advantage of the energy-based approach over the other two methods is the fact that it considers the effects of strain and stress concurrently unlike the stress or strain-based methods. Several liquefaction evaluation procedures have been developed, relating the capacity energy to initial soil parameters such as the relative density, initial effective confining pressure, fine contents and soil textural properties. Analyses have been carried out on a total of 302 previously published tests using a nonparametric regression procedure known as multivariate adaptive regression splines (MARS), to assess the capacity energy required to trigger liquefaction in sand and silty sands. The capacity energies estimated by this proposed model compare favourably with the centrifuge test data sets used for validation purpose.