



A NEUROFUZZY TECHNIQUE TO PREDICT SEISMIC LIQUEFACTION POTENTIAL OF SOILS

*Vijay Kumar, Kumar Venkatesh, R.P. Tiwari**

Abstract: Liquefaction potential is a scientific assessment parameter to assess liquefaction of medium to fine grained cohesion-less soil due to earthquake shaking. In this paper alternative liquefaction potential prediction models have been developed using adaptive neuro fuzzy inference system (ANFIS) and multiple linear regression (MLR) technique. Geological survey of the study area was performed and forty locations were identified to perform standard penetration test (SPT). Disturbed and undisturbed soil samples were collected from the borehole to execute the laboratory tests. The bore-log datasets were used for determining liquefaction potential of the cohesion-less soils. The analytical approach by Idriss and Boulanger (I & B) has been applied initially to estimate liquefaction potential of soil on the basis of standard penetration test datasets obtained from the field investigations. To develop the ANFIS models 101 datasets were collected and incorporated for the development of fuzzy neural network models. Multiple linear regression (MLR) models have also been developed and the results were compared with neuro-fuzzy models. Based on obtained results it can be stated that the developed adaptive neuro fuzzy inference system models have better prediction ability to predict liquefaction potential with satisfactory level of confidence and can be used as an alternative tool.

Key words: *Liquefaction potential, ANFIS, standard penetration test, Idriss and Boulanger multiple linear regression*

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1. Introduction

On 26th January 2001, an earthquake originated in Bhuj (India) with maximum horizontal acceleration 0.35 g, damaged many medium and high rise buildings in and around Bhuj city [1]. The city buildings experienced differential settlement by violent shaking; this phenomenon was due to liquefaction which is caused by earthquake. Soil liquefaction occurs in loose, saturated cohesion-less soil units (sands

*Kumar V. – Correspondence Author, Venkatesh K., Tiwari R. P., Civil Engineering Department, Motilal Nehru National Institute of Technology, Allahabad, Uttar Pradesh, Pin-211004, India, Tel.: +91-9616848223, E-mail: vijay03c34@gmail.com