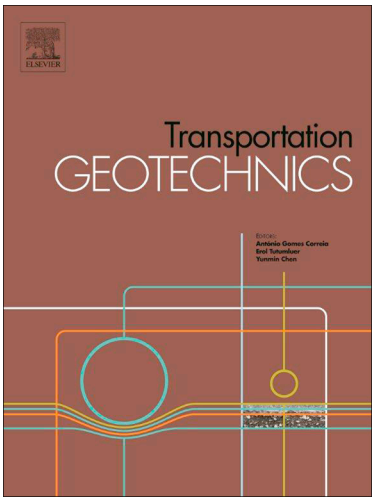

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Neural Network Based Model for Estimation of the Level of Anisotropy of Unbound Aggregate Systems

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Abstract

Directional dependency of the materials properties in granular soils is an integral component of the analysis and design of pavement foundations. Laboratory determination of such anisotropic properties is often overlooked by design engineers due to the lack of available protocols, equipment, time constraints, and budgetary issues. This research strives to bridge this gap by investigating an alternative approach to provide a practical and reliable framework to estimate the level of anisotropy of unbound granular materials. To achieve this objective, an experiment design was developed to establish a comprehensive aggregate feature database. Nonlinear and cross anisotropic material properties were determined using Variable Dynamic Confining Pressure (VDCP) stress path tests in the laboratory. Particle geometry was characterized using the Aggregate Imaging System (AIMS). Scale parameters and shape parameters of the form, angularity and textural properties of the particles were incorporated in the aggregate database to account for the shape-induced anisotropy of particulate soils. Moisture state and density parameters were also incorporated in the database for further post processing. Several neural