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Keynote Lecture

Advanced Real-time Monitoring and Health Assessment of Geotechnical Systems

ABSTRACT

Landslides, lateral spreading and other similar forms of ground failures due to natural disasters, such as heavy rains, floods and earthquakes, continue to be catastrophic events with extreme economic and societal costs, despite our increased understanding of the mechanisms of failure and large ground deformation, primarily because these events occur without much warning. Real-time monitoring programs are essential to develop warning systems of impending danger from active areas in any site specific or regional hazard program. Unfortunately the current state-of-the-art in real-time geotechnical monitoring is either based on very expensive monitoring systems or on periodic measurement of ground surface displacements. The evaluation, health monitoring and response prediction of soils exposed to extreme hazard conditions are on the verge of a paradigm shift due to new and less expensive sensing technologies, together with recent advances in information technology related to wireless sensors networking. This condition enables the development of innovative monitoring technologies in addition to advanced interactive modeling tools that utilize this real time monitoring data in construction, sensor-assisted design and early warning of impending failure hazard. The work presented herein highlights the development of novel, affordable sensing technologies for use in a framework to monitor, manage and ensure the safety of geotechnical infrastructure. The MEMS-based in-place inclinometer system, Measurand's ShapeAccelArray (SAA), is now established as a sensing tool for simultaneous measurement of 3D soil acceleration and 3D ground deformation up to a depth of one hundred meters, with an accuracy of ±1.5mm per 30m. This system is now being further developed to include digitally integrated pore pressure measurement. Each sensor array is connected to a wireless sensor node to enable real-time monitoring as well as remote sensor configuration.

THE SPEAKER

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Professor Abdoun is the recipient of the American Society of Civil Engineers (ASCE) 2009 ***"Walter L. Huber Civil Engineering Research Prize"***, the US Army "***Commander's Award for Public Service with accompanying medal***." And the 2007 ***Shamsher Prakash International Research Award*** for young engineers, scientists and researchers. He is the winner of CSCE's (Canadian Society for Civil Engineering) ***Casimir Gzowski Medal*** for best journal paper for 2004.

Abdoun's technical interests are modeling of Geotechnical and Geoenvironmental systems, 3D Advanced Field Sensors, Centrifuge & Full-scale Testing, Soil-Structure Interaction, Soil Dynamics and Earthquake Engineering, Modeling of Blast loading & Hurricane loading, Soil Remediation, Wireless Data Acquisition Systems, 3D Data viewer and Visualization. On which he has more than 130 research publications.