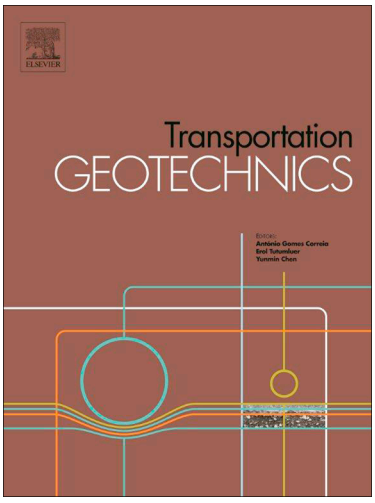

Development of Rapid Three-dimensional Finite-Element Based Rigid Airfield Pavement Foundation Response and Moduli Prediction Models

Adel Rezaei-Tarahomi, Orhan Kaya, Halil Ceylan, Sunghwan Kim, Kasthurirangan Gopalakrishnan, David R. Brill

PII: S2214-3912(17)30052-1
DOI: http://dx.doi.org/10.1016/j.trgeo.2017.08.011
Reference: TRGEO 139

To appear in: *Transportation Geotechnics*

Received Date: 17 March 2017
Revised Date: 31 August 2017
Accepted Date: 31 August 2017

Please cite this article as: A. Rezaei-Tarahomi, O. Kaya, H. Ceylan, S. Kim, K. Gopalakrishnan, D.R. Brill, Development of Rapid Three-dimensional Finite-Element Based Rigid Airfield Pavement Foundation Response and Moduli Prediction Models, *Transportation Geotechnics* (2017), doi: http://dx.doi.org/10.1016/j.trgeo.2017.08.011

Development of Rapid Three-dimensional Finite-Element Based Rigid Airfield Pavement Foundation Response and Moduli Prediction Models

Adel Rezaei-Tarahomi [1], Orhan Kaya [2], Halil Ceylan [3]*, Sunghwan Kim [4], Kasthurirangan Gopalakrishnan [5] and David R. Brill [6]

Abstract:

Designing pavement foundation for rigid airfield pavements and understanding the contribution of pavement foundation elements to overall pavement performance and pavement failure have been challenges for the rigid airfield pavement design community. While many models have been developed to best simulate pavement foundation behavior for rigid airfield pavements, many of them have focused only on the failure of Portland Cement Concrete (PCC) layer and did not sufficiently consider the contribution of pavement foundation to the failure. The Federal Aviation Administration's (FAA's) pavement design software, FAARFIELD, considers the maximum horizontal stress at the bottom edge of the concrete slab for bottom-up cracking failure of a PCC layer, but does not consider the critical responses for failure of subbase and subgrade layers in rigid pavement design. It is clear that incorporating critical pavement foundation responses into pavement design procedures is of great interest. The primary objective of this paper is to investigate the feasibility of developing rapid three-dimensional finite-element (3D-

1 Graduate Student, Iowa State University, Ames, IA. Email: adelrt@iastate.edu

2 Graduate Student, Iowa State University, Ames, IA. Email: okaya@iastate.edu

3* Professor, Iowa State University, Ames, IA. Email: hceylan@iastate.edu (corresponding author)

4 Research Scientist, Iowa State University, Ames, IA. Email: sunghwan@iastate.edu

5 Research Associate Professor, Iowa State University, Ames, IA. Email: rangan@iastate.edu

6 Program Manager, FAA Airport Technology R&D Branch, ANG-E262 William J. Hughes Technical Center Atlantic City International Airport, NJ 08405 E-mail: David.Brill@faa.gov