

CONTACT MECHANICS TECHNIQUES APPLIED TO STUDY 3D PAVEMENT STRUCTURE DESIGN

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ABSTRACT

The basic aim of this work is to solve pavement structures by numerical simulations using a new technique to analyze them applying 3D finite element formulations with contact mechanics. For these propose the Augmented Lagrangian method is used [8]. This study is performed just placing two tires on the pavement structure, see Figure 1. These tires and the pavement structure are discretized by finite elements under large 3D elastoplastic deformation. The real loads (of aircrafts, trucks or cars) are applied directly on each tire and by contact mechanics procedures, the real contact area between the tires and the pavement surface is computed. The penetration conditions and the contact interfaces are investigated in details. Furthermore, the pressure developed at the contact surfaces is automatically calculated and transferred to the pavement structure by contact mechanics techniques. In the end of this work, numerical results in term of stress and strain are presented to show the ability of the algorithm. These numerical results are also compared with the ELSYM5 program.

KEY WORDS: Pavement structure, numerical simulation, contact mechanics, elastoplasticity, airport pavement.