عنوان مقاله:

Stress Analysis of Tractor Tire Interaction whit Soft Soil using Non-linear ۲D Finite Element Method

محل انتشار:

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خلاصه مقاله:

Abstract: Compaction under tractors tires is of special concern because the weight of these machines has increased dramatically in the last years. These machines and others associated with crop cultural practices weight enough to significantly compact the soil, especially if the soil is soft with high moisture content during tilling, planting, or harvesting. The stress distribution and the size and form of the tire-soil interface are decisive for the stress propagation in the soil profile. The finite element method is a very useful numerical tool in evaluating different effects of tire on the soil. The goals of this study are to model the response of a soft soil, in relation to tire pressure and axle load. To validate the model by comparison with measured responses in the literature for such a soil and develop the ۲D symmetric multi-laminated model of a tractor tire interaction with soft soil and to verify the result with measured field response data reported in the literature. In this study we use a (۲D) axisymmetric tire model for the numerical simulation of soil-tire interaction under different load and inflation pressure. The Maximum soil-tire pressure for ۷۰ kpa inflation pressure and ۱۵kN axel load was ۸۳.۷ kpa which were approximately ۳۰% less than the stress at the tire contact patch in the field test as cited in the literature. Although in previous investigations with a ۳D analysis the difference was ۳۶%. Maximum vertical stress at contact area with ۱۵۰kPa inflation pressure and ۱۵ kN axel load was ۹۸.۶ kPa that was not significantly different than was ۱۰۱ kPa reported with ۳D analysis. In general, more accuracy in ۲D compared than whit ۳D analysis was obtained due to more accurate meshing in ۲D analysis. This investigation shows that maximum stresses in tire occurred at the side wall. Results showed that a simple ۲D axisymmetric model .can show soil-tire stresses whit good accuracy

کلمات کلیدی: