



بسم الله الرحمن الرحيم

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Modelling of the Stresses and Deflection Distribution in Airport Rigid Pavement Using Finite Element Analysis

نمذجة توزيع الاجهادات و الانحراف في الرصف الصلب للمطار باستخدام
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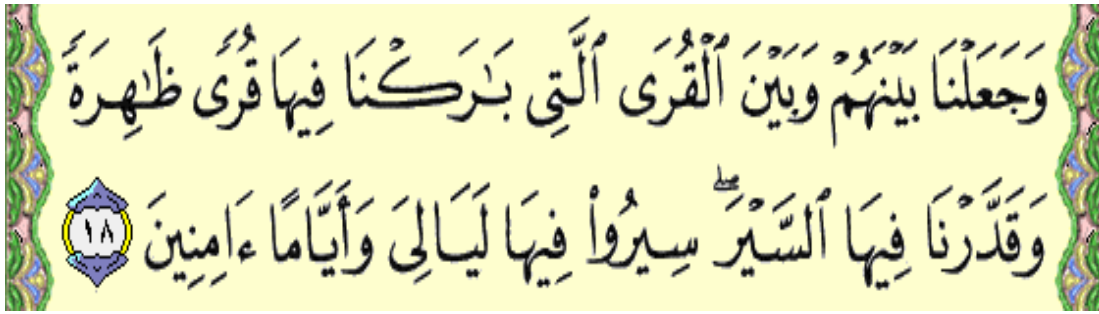
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ABSTRACT

This study includes the stress and deflection response analysis of a concrete pavement resting on elastic foundation (spring foundation) subjected to static circular aircraft wheel loads at interior part of airport concrete pavement by using Westergaard's closed form solution. These results were compared with three dimensional finite element (3DFE) modelling of the pavement using ANSYS finite element program. The model was created in static structure analysis in ANSYS. A load of 166.5 Ksi having circular contact area of radius of 13.5 in was applied on a plate, foundation for plate is modelled as elastic foundation with modulus of elasticity and Poisson's ratio is 4000000 psi and 0.15 respectively with 8 nodes elements was used to model the rigid pavement with 100 mm mesh size. High stress was observed on runway concrete pavement due to the design aircraft load which is equivalent to 1096.4 psi. The vertical deformation of the runway concrete pavement value due to the aircraft load obtained by ANSYS is 0.083138 in. The comparison shows close agreement of the results of stress and deflection using analytical and finite element analysis. Thus, the study reveals that Finite Element Method is applicable and is a reliable tool for airport concrete pavement analysis.

هذه الدراسة شملت تحليل الاجهادات و الانحراف للرصف الخرساني مستنداً علي طبقة تأسيسية مرنة باستخدام حمل مركز لعجل الطائرة التصميمية عند منتصف جزء من الرصف الخرساني للمطار باستخدام طريقة ويسترجارد. هذه النتائج تمت مقارنتها مع (باستخدام برنامج العنصر المحدد 3DFE نموذج العنصر المحدد ثلاثي الابعاد) . تم تطبيق حمل مقداره 166.5 كيلورطل لكل بوصة مربعة بمساحة ANSYS). احتكاك دائرية نصف قطرها 13.5 بوصة، قاعدة البلاطة في النموذج تم اختيارها كأساس مرن بمعامل مرونة و نسبة بويسون تساوي 4000000 رطل لكل بوصة مربعة و 0.15 علي التوالي. النموذج المستخدم للرصف الخرساني عنصر من ثمانية ANSYS العنصر المحدد. عقد مقسم لكل 100 بوصة. أقصى اجهاد باستخدام برنامج اعتمادا علي حمل الطائرة التصميمي يساوي 1096.4 رطل لكل بوصة مربعة و الانحراف حوالي 0.083138 بوصة. من المقارنة وجدت النتائج متقاربة بين الطرق التحليلية و طريقة العنصر المحدد. الدراسة اثبتت ان طريقة العنصر المحدد مناسبة و كأداة فعالة لتحليل الرصف الخرساني للمطار.