Modeling of punching shear failure of lightweight RC slabs and ferrocement slabs

HA Dahish and AM El-Kholy International Conference on Advances in Structural and Geotechnical Engineering (ICASGE'15), **Ref. STA4277**
Pages 1-8 -April 2015, Hurghada, Egypt

This paper presents numerical investigation for punching shear failure of normal and lightweight aggregate Reinforced Concrete (RC) slabs, and ferrocement slabs utilizing Expanded Metal Mesh (EMM) layer instead of regular flexural reinforcement. Three-dimensional nonlinear Finite Element Analysis (FEA) was applied to simulate the structural behavior and to estimate the punching shear strength of six concrete slabs. The modeled specimens involve slabs cast form normal weight RC, lightweight RC and cementitious mortar with reinforcement (grid of bars or layer of ferrocement) on the tension face. The concrete slabs were modeled using the finite element software ANSYS V.14. Both material and geometric nonlinearities were considered in modeling. Solid element and space bar were used to model the concrete and reinforcement grid, respectively. The EMM layer was considered as smeared layer embedded within the solid elements. The load-deflection behavior and crack pattern of the slabs were studied. The numerical results were validated with published experimental data, in terms of load capacity and maximum displacement. The numerical results appeared to be in good agreement with the experimental. The developed FE models provide good tool for predicting the punching shear resistance for RC slabs (normal and lightweight aggregate concrete), and cementitious slabs reinforced with mesh of bars or layer of ferrocement.