

Finite Element Analysis of Punching Shear of RC Slabs

Katerina Genikomsou
Assistant Professor
Civil Engineering Department
Queen's University

Abstract

Concrete flat slabs are vulnerable to punching shear failure at shear critical sections in the vicinity of the column in slab-column connections. This brittle mode of failure was examined by many researchers through laboratory experiments. However, the existing punching shear testing database cannot address all aspects of punching shear stress transfer mechanism. Therefore, advanced finite element analyses (FEA) are used to supplement the existing testing background and can be used for parametric investigation, since through modeling the different aspects of punching shear failure may be explored in detail, to enable understanding of the phenomena that control the response, and to support drafting R.C. design code requirements. This presentation describes research on calibrating constitutive and finite element models in the commercial FEA software ABAQUS to investigate punching shear behaviour of concrete slabs. A coupled damaged-plasticity model is considered for modeling the concrete slabs without and with shear reinforcement. The developed formulation has been applied to parametric studies on punching shear in slabs and the primary findings of these studies are discussed.

Short Bio

Dr. Katerina Genikomsou is an assistant professor in Civil Engineering Department at Queen's University in Canada. She received her Ph.D. degree in Civil Engineering from the University of Waterloo, where her research was focused on the nonlinear Finite Element Analysis (FEA) of punching shear of reinforced concrete slab-column connections. Prior to her Ph.D. studies Katerina did her undergraduate and Master's studies in Greece at Democritus University (5-year Diploma in Environmental Engineering, a second undergraduate Diploma in Civil Engineering, and a Master's Degree in New Materials and Technologies in the Design of Reinforced Concrete Structures). Katerina worked as a post-doctoral researcher at the University of Waterloo where she developed a shear testing protocol for GFRP bars of various diameters. Her research interests include Design and Analysis of RC Structures, Punching Shear Design of RC Slabs, Nonlinear Finite Element Analysis, Constitutive Modelling and Fiber Reinforced Polymers. Katerina is a voting member of the ACI/ASCE Committee 421- Design of RC slabs and an associate member of the ACI/ASCE Committees: 445-Shear and Torsion, 352- Joints and Connections in monolithic concrete structures and 447-Finite Element Analysis of RC Structures

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