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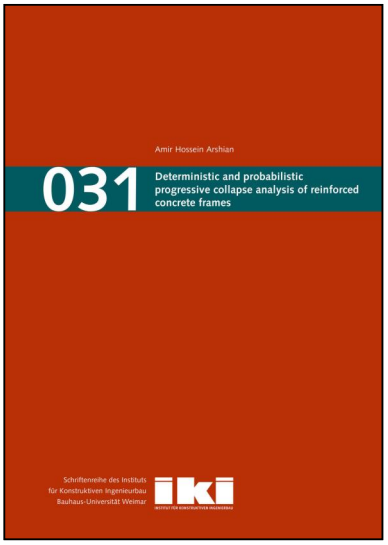
Deterministic and probabilistic progressive collapse analysis of reinforced concrete frames

This thesis studies the effectiveness of finite element macro modeling approaches in predicting the collapse resisting mechanisms such as the membrane actions. Following the validation studies on structural sub-assemblages, the alternate path mechanism is studied in 3D using nonlinear dynamic analysis. Contrary to the previous studies, this research investigates the influence of the failure-sequence in extreme initial damage scenarios. Furthermore, probabilistic characteristics of the alternate path structural response quantities as well as the ultimate load-bearing capacity of laterally restrained slabs are studied using variance-based sensitivity analysis. In particular, the influence of modeling strategies and use of substructure techniques are comprehensively discussed to develop a model quality framework for progressive collapse analysis of reinforced concrete frame structures.



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