

RCCES Seminar series, Thursday 25th April 2019, 5:30 pm, Room C300

Advances in Robustness Assessment of Multi-storey Buildings

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This seminar presents recent developments undertaken at Imperial College London in the assessment of structural robustness, with particular focus given to multi-storey buildings. Prescriptive and performance-based approaches that are included in various design codes are first outlined, including tying force requirements and alternate load path methods. The shortcomings of the tying force requirements, with the neglect of ductility considerations, and the over-simplification in some alternate load path approaches, that can lead to unconservative assessment, are highlighted. A recently developed multi-level approach for robustness assessment is then presented, which was the first such approach to consider the combined influence of ductility, redundancy, energy absorption capacity and dynamic behaviour within a practical design-oriented framework. Within this approach, the pseudo-static capacity is identified as a quantitative measure of robustness, which is established from a transformation of the nonlinear static response using an energy balance concept. The application of the developed framework is demonstrated via a case study, and the influences of such factors as the level of modelling detail, membrane action, infill panels and successive component failures are highlighted.

Bassam Izzuddin is Professor of Computational Structural Mechanics and heads the CSM group at Imperial College London. Since joining Imperial in 1990, he has developed advanced nonlinear analysis methods for structures subject to extreme loading, and he has engaged in national/international collaborations with industry and fellow academics on applied structural engineering research utilising his program ADAPTIC. Besides major developments in detailed modelling, he has also developed a range of simplified analysis methods, which are currently being applied in design practice for offshore and building structures. Most relevant to the topic of this seminar, he has developed a simplified multi-level framework for robustness assessment of multi-storey buildings subject to sudden column loss scenarios, which is most cited in the field and widely applied in practice. He is also currently part of a project team tasked with the development of robustness provisions for the next generation of the Eurocodes. His publication record exceeds 280 papers in leading international journals and conferences.