Practical Modelling of RC Structural Walls under Monotonic and Cyclic Loading

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Abstract : Shear walls have been used extensively as the main lateral force resisting systems in multi-storey buildings. The recent development in performance based design urges practicing engineers to conduct nonlinear static or dynamic analysis to evaluate seismic performance of multi-storey shear wall buildings by employing distinct analytical models suggested in the literature. For practical purpose, application of macroscopic models to simulate the global and local nonlinear behavior of structural walls outweighs the microscopic models. The skill level, computational time and limited access to RC specialized finite element packages prevents the general application of this method in performance based design or assessment of multi-storey shear wall buildings in design offices. Hence, this paper organized to verify capability of nonlinear shell element in commercially available package (Sap2000) in simulating results of some specimens under monotonic and cyclic loads with very oversimplified available cyclic material laws in the analytical tool. The selection of constitutive models, the determination of related parameters of the constituent material and appropriate nonlinear shear model are presented in detail. Adoption of proposed simple model demonstrated that the predicted results follow the overall trend of experimental force-displacement curve. Although, prediction of ultimate strength and the overall shape of hysteresis model agreed to some extent with experiment, the ultimate displacement(significant strength degradation point) prediction remains challenging in some cases.