FLEXURAL STRENGTH AND MOMENT-CURVATURE CHARACTERISTICS OF SLENDER RECTANGULAR RC WALL SECTIONS

Sunitha PALISSERY
PhD Scholar, Indian Institute of Technology Madras, India
sunithapmenoniitm@gmail.com

Murty C. V. R
Professor, Indian Institute of Technology Madras, India
cvrm@iitm.ac.in

Rupen GOSWAMI
Assistant Professor, Indian Institute of Technology Madras, India
rg@iitm.ac.in

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Nonlinear static pushover analysis is used to assess seismic behaviour of structures reasonably well. Commercial structural analysis softwares currently available to perform pushover analysis require definition of inelastic regions as idealised bilinear load-deformation response curves. Reinforced concrete (RC) structural walls in mid-rise buildings form the lateral load resisting system (LLRS). Thus, proper idealized moment-curvature response curves of these relatively slender RC walls form the key input for pushover analyses of such buildings. The idealized moment-curvature response curve must represent the cracked stiffness, flexural strength, and curvature ductility of the wall. Estimation of flexural strength and curvature ductility depends on significant strain levels in concrete and reinforcement bars at the onset of critical damage states. Yielding of extreme layer of tension reinforcement and secondary compression failure of extreme compression fibre in concrete are two such critical damage states of RC sections. A methodology to arrive at idealised moment-curvature curve of RC wall sections that can be used as an input to perform pushover analysis is proposed in the study.

Idealized moment-curvature curve, of deep RC wall sections with distributed longitudinal steel across the depth, needs to consider yielding of an inner layer of longitudinal reinforcement as against yielding of the (extreme layer of) tension reinforcement in shallow beam sections. The paper presents a methodology for deep RC rectangular wall sections with distributed steel to first identify this critical *inner* layer of reinforcement below the centroidal axis (on tension side) based on energy balance of idealised moment-curvature curve with actual nonlinear curve, and then, to develop idealized moment-curvature response curve considering yielding of this inner layer of reinforcement representing the salient damage state. Further, the distance of the critical *inner* layer of tension reinforcement from extreme compression concrete fibre depends on percentage of longitudinal reinforcement bars in the section; the distance of the critical inner layer of reinforcement from the extreme compression fibre in concrete varies from 0.5 times the overall depth (*D*) to 0.7*D* with increase in percentage of longitudinal reinforcement.

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