State-of-the-art in nonlinear finite element modeling of isolated planar reinforced concrete walls

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A number of finite element modeling approaches for reinforced concrete (RC) structural walls have recently become available for both research purposes and design applications. Five conceptually-different state-of-the-art finite element models for RC walls are described and evaluated in this paper, including models based on either a fixed-crack or a rotating-crack approach for simulating the biaxial behavior of concrete under plane-stress state, models characterized with either a single- or a multi-layered representation of the wall cross-section, and models with or without consideration of various individual failure mechanisms (e.g., buckling of reinforcement, out-of-plane instability). Modeling approaches were validated against experimental data obtained for five benchmark RC wall specimens, all with rectangular cross-sections, yet are differentiated by a range of salient response characteristics (e.g., aspect ratio, axial load, failure mechanism), in order to asses