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عنوان مقاله:

Effect of Cyclic Loadings on the Shear Strength and Reinforcement Slip of RC Beams

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خلاصه مقاله:

Numerous studies of the response of reinforced concrete members under cyclic loadings, many of which have been summarized and have indicated that, in general, the flexural strength of under-reinforced beams remains unimpaired under cyclic loadings consisting of a reasonable number of cycles. However, there is a body of evidence indicating that their shear strength may suffer under such loadings. The first objective of the current study is to construct an accurate 2D shell finite element model of reinforced concrete beams under cyclic loadings. The second objective is carrying out a parametric study on reinforced concrete beams, using the suggested 2D shell model. The objective of this study was to observe the effect of the stirrup spacing, steel-to-concrete bond properties on the performance of reinforced concrete beams under cyclic loadings. For this purpose, an efficient and accurate finite element model was established taking into account the compression and tensile softening introducing damage in the concrete material, the Baushinger effect using nonlinear isotropic/kinematic hardening in the steel and an adequate bond-slip law for the concrete–steel interface. The simulated results of numerical models were verified by experimental results available in literature in order to validate the proposed model, including hysteretic curves, failure modes, crack pattern and debonding failure mode. The model provided a strong tool for investigating the performances of reinforced concrete beam. The results showed that: Cyclic loadings may change the failure mode of the beam to bond failure even though it has sufficient bond length to resist static loadings. So that under cyclic loadings additional anchorage length must be taken, cyclic loadings also influence the ductility and peak load for beams fail in shear. All these topics are of the utmost importance to RC behaviour to be considered by construction codes

کلمات کلیدی:

Finite Element Models; Reinforced Concrete Beams; Damage; Plasticity; Cohesive Model; Cyclic Behavior

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