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Three-Dimensional Numerical Investigation for Reinforced Concrete Slabs with Opening

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Abstract : This article presents a 3-D modified non-linear elastic model in the strain space. The Helmholtz free energy function is introduced with the existence of a dissipation potential surface in the space of thermodynamic conjugate forces. The constitutive equation and the damage evolution were derived as well. The modified damage has been examined to model the nonlinear behavior of reinforced concrete (RC) slabs with an opening. A parametric study with RC was carried out to investigate the impact of different factors on the behavior of RC slabs. These factors are the opening area, the opening shape, the place of opening, and the thickness of the slabs. And the numerical results have been compared with the experimental data from literature. Finally, the model showed its ability to be applied to the structural analysis of RC slabs.

Keywords : damage mechanics, 3-D numerical analysis, RC, slab with opening
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