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Method for calculating compression resistance of reinforced masonry elements using deformation diagrams

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Abstract: When calculating the compression resistance of reinforced masonry elements, only the final stage before failure is considered. Complete material deformation diagrams and the redistribution of forces between masonry and longitudinal reinforcement in any given cross-section are not considered. Therefore, the purpose of this study is to develop a methodology to calculate the compression resistance of reinforced masonry elements that considers the physical nonlinear deformation of unreinforced and masonry with transverse reinforcement in horizontal mortar joints and longitudinal steel reinforcement, which will allow obtaining deformation parameters at any loading stage. Calculation algorithms for compression resistance and deformation of masonry elements at any loading stage are presented. The used experimental studies of the most characteristic reinforced masonry elements were selected studies published in open access sources. Verification of the proposed calculation methodology was performed and showed a good convergence of the theoretical and experimental values of load-bearing capacity and deformability.

Keywords: physical nonlinearity; reinforced masonry element; material deformation diagram approach; elastoplastic work; uniaxial stress state; idealised parabolic-line diagrams; nonlinear parabolic deformation diagrams; compressive resistance.

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