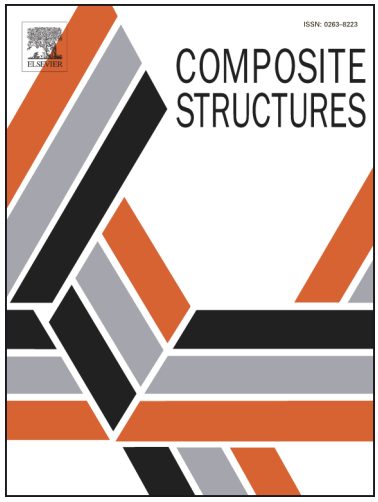

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Modeling of FRP-strengthened curved masonry specimens and proposal of a simple design formula

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Abstract. *The present paper aims at developing a simple but effective numerical model for the study of the bond behavior of Fiber Reinforced Strengthening systems (FRP) externally applied on curved masonry substrates. The main peculiarities of the proposed model are its simplicity and the possibility to straightforwardly introduce at the interface level coupled cohesive laws for accounting a mixed mode debonding mechanism. Indeed, the model relies on a discretization based on in-series and in-parallel springs for modeling the substrate, the reinforcement and the reinforcement/substrate interface layer. In particular, while both the substrate and the reinforcement springs are assumed linear-elastic, nonlinear constitutive laws are accounted for the interface springs where, in addition, a coupled behavior between normal and shear springs is assumed considering the Mohr-Coulomb failure domain. The proposed numerical model is used in the paper as a tool for the assessment of formulas specifically devoted to the evaluation of the bond resistance of curved masonry samples strengthened with FRPs. In particular, both formulas derived from the closed form solution of equilibrium equations and a formula derived by approximating the closed form solution through an exponential law are here presented. With the main purpose to validate the proposed model, numerical analyses are preliminary presented in the paper with reference to experimental bond tests on masonry samples with concave and convex substrate configurations strengthened by glass FRP strips. Then, further numerical analyses developed by considering different values of the geometry curvature and mechanical properties of the interface, are subsequently developed with the main goal to check the reliability of the proposed formulas.*

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