On the comparison of material interpolation schemes and optimal composite properties in plane shape optimization, Grzegorz Dzierżanowski

Structural and Multidisciplinary Optimization, vol. 46(5), pp 693-710

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This paper deals with the classical problem of material distribution for minimal compliance of twodimensional structures loaded in-plane. The main objective of the research consists in investigating the properties of the exact solution to the minimal compliance problem and incorporating them into an approximate solid-void interpolation model. Consequently, a proposition of a constitutive relation for a porous material arise. The non-smoothness of stress energy functional known from the approach based on homogenization may be thus avoided which is beneficial for the numerical implementation of the scheme. It is next shown that the simplified variant of the proposed formula justifies and generalizes the RAMP (Rational Approximation of Material Properties) interpolation model of Stolpe and Svanberg (Struct Multidisc Optim 22:116–124). In the second part of the paper, explicit formulae ...