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# Effective response of a nonlinear differential laminate assemblage

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## Abstract

We derive closed-form expressions for the effective conductivity of a class of powerlaw “differential” laminates in arbitrary dimension, studied in a previous work (Idiart and Ponte Castañeda 2013). Emphasis is put on the weakly and strongly nonlinear regimes, and on the asymptotic behavior of such composites in the “dilute limit” of a vanishingly small volume fraction of one of the two phases. In the strongly nonlinear limit, we examine the behavior of these solutions as the partial derivative equations lose ellipticity. We provide a geometric interpretation of our results in terms of field localization. We examine the behavior of the solutions at increasing dimensions and whether they could represent bounds. Finally, we discuss implications to the mechanics of composites.

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