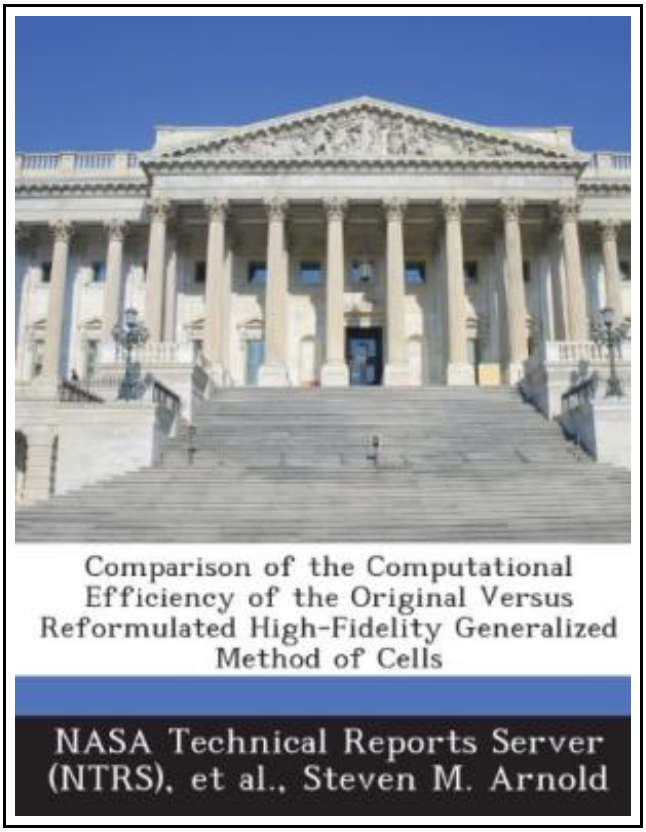
Comparison of the Computational Efficiency of the Original Versus Reformulated High-Fidelity Generalized Method of Cells



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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 30 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.The High-Fidelity Generalized Method of Cells (HFGMC) micromechanics model has recently been reformulated by Bansal and Pindera (in the context of elastic phases with perfect bonding) to maximize its computational efficiency. This reformulated version of HFGMC has now been extended to include both inelastic phases and imperfect fiber-matrix bonding. The present paper presents an overview of the HFGMC theory in both its original and reformulated forms and a comparison of the results of the two implementations. The objective is to establish the correlation between the two HFGMC formulations and document the improved efficiency offered by the reformulation. The results compare the macro and micro scale predictions of the continuous reinforcement (doubly-periodic) and discontinuous reinforcement (triply-periodic) versions of both formulations into the inelastic regime, and, in the case of the discontinuous reinforcement version, with both perfect and weak interfacial bonding. The results demonstrate that identical predictions are obtained using either the original or reformulated implementations of HFGMC aside from small numerical differences in the inelastic regime due to the different implementation schemes used for the inelastic terms present in the two formulations. Finally, a direct comparison of execution times is presented for the original formulation and reformulation code implementations. It is shown that as the discretization employed in representing the composite repeating unit cell becomes increasingly refined (requiring a larger number of sub-volumes), the reformulated implementation becomes significantly (approximately an order of magnitude at best) more computationally efficient in both the continuous reinforcement (doubly-periodic) and discontinuous reinforcement (triply-periodic) cases. This item ships from La Vergne,TN. Paperback.

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