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Comparison of Homogenization Schemes to Periodic and Random Simulations

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Assessment of the efficiency of the Interaction Direct Derivative homogenization scheme by comparison to Finite Element Simulations.

We compare random simulations with periodic simulations, (−−), to determine the poroelastic constants by measurement of strain and stress averages.

We modify the IDD scheme to improve the results according to a simple geometrical rule and an optimization procedure. The aspect ratio of the atmosphere needs to change from 1 to that of the inclusion 0.1 when the volume fraction f increases.

Finally we compare three estimates to simulations in the case of randomly oriented pores. The results obtained with IDD-A are very satisfactory.

The IDD scheme, when used with adapted shapes for the atmospheres, gives good results to predict the homogenized properties of crack-like pores, whether aligned or isotropically oriented.

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References