Tortuosity: Local Morphology and Global Topology Combination

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Johan Chaniot[1], Maxime Moreaud[2], Loïc Sorbier[3], Jean-Marie Becker[4], Thierry Fournel[4], Yann Gavet[1]

[1]Mines Saint-Etienne, Univ Lyon, CNRS, UMR 5307 LGF, Centre SPIN, F-42023 St-Etienne, France
[2]Manufacture Française des Pneumatiques Michelin, 23 Place des Carmes, Déchaux, 63000 Clermont-Ferrand, France
[3]IFP Energies nouvelles, Rond-point de l'échangeur de Solaize, BP 3, 69360 Solaize, France
[4]Univ. Lyon, UJM-Saint-Etienne, CNRS, Institute of Optics Graduate School, UMR 5516 LaHC, F-42023 St-Etienne, France

Abstract

Tortuosity [1], a multifaceted concept, aims to describe the impact of a constraint, i.e., a microsctructure, over some particles traveling through the porous network. The tortuosity under consideration in this study is computed by considering distances ratio [2] quantifying microstructure's morphology and topology. By leveraging the versatility of geodesic distance transform to consider gray-level images, we propose a new definition of tortuosity, named multi-constraint tortuosity. Based on this novel definition, a extension of the original *M-tortuosity* is defined, which allows the analysis of images of real materials and of binary images of porous media enhanced by local feature fields. The efficiency of our novel approach is demonstrated through its application on random schemes simulating complex microstructures [3]. These innovative and versatile solutions for pattern and microstructure analyses are made accessible through an easy-to-use plug-in in a free-access software named plug im!.

References

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