Rough Surface Modeling of PDMS Polymer Through Fractal Dimensions

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Abstract

A good approximation of rough surfaces and their random behaviour is very important in some engineering problems. Fractal modelling provide an alternative to generate rough surfaces based in statistically self-similar non-Euclidean geometries, as seen in [Fig. 1]. Through a frequency domain analysis, it's possible to measure the Hurst exponent of a statistically self-similar geometry with an associated spectral power density, and extract the fractal exponent, it may represent a structure as an assemble of unitary self-contained cells. Fractal analysis mixed with Comsol Multiphysics, will be applied in modelling rough surfaces of PDMS polymer of force sensing resistors, based in AC/DC, solid mechanics and MEMS modules. As a result, the fractal model can generate rough surfaces in different coordinate systems, this is an important feature for the study of conductive paths in thin insulating film sensors.

Figures used in the abstract

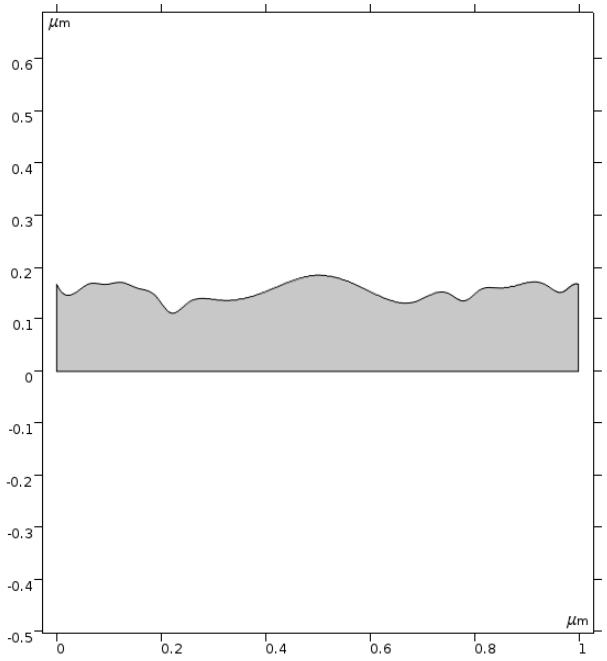

Figure 1: Cross-sectional area of PDMS thin insulating film