Morphological and topological evolution of contact clusters

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When two rough surfaces come in contact, they touch over small zones that represent the true area of contact. Under the increasing pressure, these zones grow, change in shape, meet and change their topology (see Fig. 1) [1]. All of these changes are affected by the mechanical behavior of the underlying materials as well as by the rheology of the fluid that separates the contacting surfaces. In this study, we make an attempt to characterize (1) the shapes of contact clusters and (2) the topological changes that they can undergo. In addition we will make a link between these geometrical aspects and the parameters of the surface roughness, material models and the properties of the interface fluid. The percolation properties of the contact clusters will be also studied as well as the effect of the fluid (compressible or incompressible) trapped in the contact zones [2]. A link is made between the topological characteristics of contact clusters and the self-consistent mean-field model for the permeability of contact interfaces.

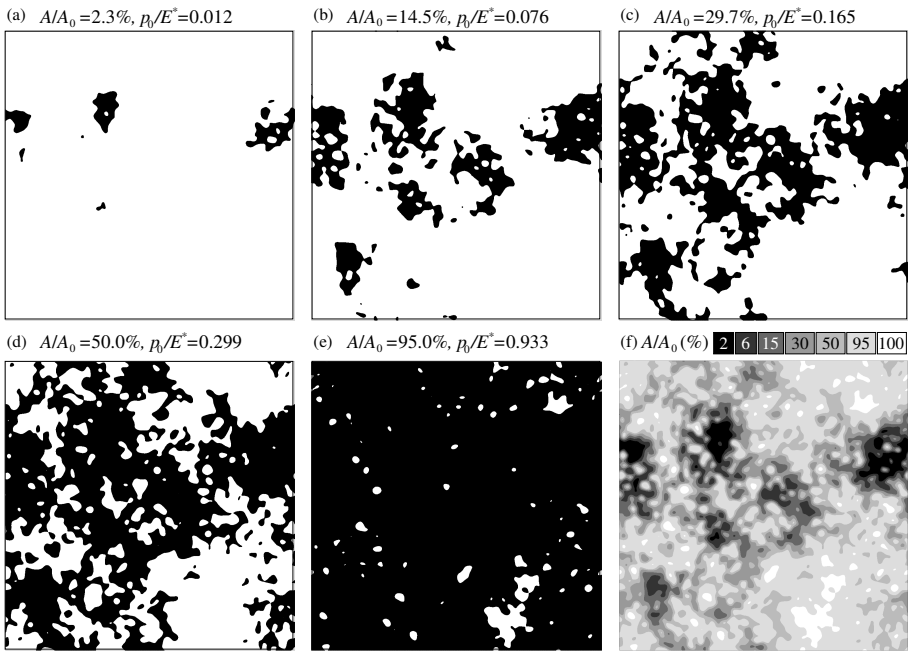

Figure 1. Evolution of the true contact area A/A_0 under the increasing normalized pressure p_0/E^*

Références

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