Fracture path in an anisotropic material in the light of a friction experiment

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We report on the trajectory of a solid pulled across a solid surface exhibiting anisotropic frictional properties. The system can be considered as analogous to the opening of a fracture in the shear mode (mode II), the contact plane between the two solids being the fracture plane. Indeed, the energy dissipated by friction is proportional to the sliding distance, like the energetic cost of the fracture is proportional to the fracture length. The configuration is however far more simple because the elastic energy loaded in the system reduces to the energy loaded in the link by which the slider is pulled. The latter can be easily described theoretically and assessed experimentally. Moreover, we are sure, in the frictional system, that the anisotropy is only introduced in the friction and not in the elastic properties.

We first show experimentally that the trajectory of the slider is ruled by the *Maximum of Energy release Rate* criterion, which is generally used to predict the path of a fracture, at least in our experimental conditions of a rigid link, of small anisotropy, and of continuous sliding. Then, we report complementary measurements of the force and trajectories obtained for larger anisotropy.

Références

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