Stochastics Models of Interfaces with Damage: A Numerical Study

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Interphases between solids play a crucial role in the behaviour of structures, whether natural or industrial. It is very important to predict their ageing under various stresses (mechanical, thermal, environmental, etc.). The difficulty in modelling is essentially due to the very small dimensions of the interfaces compared with those of the structures. A classical technique for overcoming this difficulty is to use asymptotic techniques, with the interphase modelled by an interface [C. Licht (2007), S. Dumont, F. Lebon and R. Rizzoni (2014)]. These techniques can be used to introduce a damage parameter, which can be interpreted as a microcrack density [E. Bonetti, G. Bonfanti, F. Lebon and R. Rizzoni (2017)].

Since the damage is not totally predictable, stochastics models are introduced into the damage evolution equation. However, these problems are difficult to analyse mathematically [C. Bauzet, E. Bonetti, G. Bonfanti, F. Lebon and G. Vallet (2017)] and solve numerically. Numerical simulations on academic examples are presented to illustrated the properties of the proposed models.