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Superlinear free-discontinuity models: relaxation and phase field approximation

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We develop the Direct Method in the Calculus of Variations for free-discontinuity energies whose bulk and surface densities exhibit superlinear growth, respectively for large gradients and small jump amplitudes. A distinctive feature of this kind of models is that the functionals are defined on SBV functions whose jump sets may have infinite measure. Establishing general lower semicontinuity and relaxation results in this setting requires new analytical techniques. In addition, we propose a variational approximation of certain superlinear energies via phase field models. This is a joint work with Sergio Conti and Matteo Focardi.

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