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**ON THE VARIATIONAL CHARACTERIZATION OF SOLUTIONS
TO A NONSMOOTH CAHN-HILLIARD EQUATION**

STEPHEN ROBINSON

Consider the functional

$$J(u) = \frac{\epsilon^2}{2} \int_0^1 |u'|^2 dx + \int_0^1 F(u) dx, u \in W^{1,2}(0, 1),$$

where F is a *double-well potential* such as $F(u) = (1 - u^2)^2$. This functional represents the total free energy in models of phase transition. In this talk I describe how the complete list of critical points for J can be found and then classified as either minima or saddle points. Of particular interest will be some rather surprising continua of critical points that only appear when F loses its smoothness at $u = \pm 1$.

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