

On the Triple Junction problem for the Vector Allen-Cahn on the Plane without Symmetry Hypotheses

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We investigate the Allen-Cahn system with a potential with three global minima. We establish the existence of an entire solution which possesses a triple junction structure. The point of departure is an energy lower bound that plays a crucial role in estimating the location and size of the diffuse interface. We do not impose any symmetry hypotheses on the solution or on the potential. The problem was solved in a stronger form in 1996 by Bronsard, Gui and Schatzman, in the context of equivariant solutions under the symmetry group of the equilateral triangle, and subsequently further improved in 2021 by G.Fusco who eliminated the reflections, keeping otherwise the set-up and the conclusions. The stability of the solution in those works was with respect to symmetric perturbations. This is joint work with Zhiyuan Geng of Purdue University.