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Variational construction of spike layer solutions to a singularly perturbed Neumann problem

Abstract

For singularly perturbed nonlinear elliptic problems with the Neumann boundary condition, it is known by Ni and Takagi through a series of papers about 30 years ago that a mountain pass solution has one concentration point which approaches to a maximum point of the mean curvature on the boundary. For a nondegenerate critical point of the mean curvature, an existence of a solution with a concentration point near the point had been proved by JC Wei in 1997 under a nondegeneracy condition for a limit problem.

It was a challenging problem to construct such a solution without the nondegeneracy. I would like to introduce the resolution of the problem by a purely variational method which does not depend on the nondegeneracy.