

The Stability-compactness Method and Qualitative Properties of Nonlinear Elliptic Equations

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In this talk, I report on a series of works with Cole Graham on semi-linear elliptic equations with positive non-linearities. Solutions represent stationary states of reaction-diffusion equations. We focus on qualitative properties such as uniqueness, symmetries, and stability. The main motivation is to study these equations in general unbounded domains, which exhibit remarkably rich behavior. Our method rests on decomposing the problem into a compact part and one for which a stability result can be derived and then to combine the two. This approach has proved to be unexpectedly versatile and in fact, encompasses past works on the subject such as the general moving plane method.

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