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Spikes and vortices in inhomogeneous environments

I will discuss spike distribution in reaction-diffusion systems with space-dependent parameters. This involves two levels of reduction: first, we use by-now standard asymptotic techniques to derive a system of reduced equations for spike centers and height. Second, we take a continuum limit of the reduced system, resulting in novel system of nonlocal PDE's. Finally the resulting PDE's are solved asymptotically to yield an effective description of spike density. As a bonus, we obtain instability thresholds for N spikes in one dimension. We also generalize these results in two dimensions. Several open questions will also be presented.