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**Chaoqun Huang\*** ([huang65@math.purdue.edu](mailto:huang65@math.purdue.edu)), west lafayette, IN 47906, and **Aaron Nung Kwan Yip**. *Singular Perturbation and Bifurcation of Transition Layers in Inhomogeneous Media*.

The connection between diffused and sharp interfacial problems in the variational setting are well developed to a large extent by means of Gamma-convergence and also purely analytical techniques such as asymptotic expansion and implicit function theorem. They work well for the case of global minimizers and non-degenerate critical points. This talk will describe some results which extend the above framework to analyze the degenerate case, in particular the bifurcation of diffused interface and its connection to sharp interfacial limit. Examples of such bifurcation phenomenon using bistable nonlinearity together with parameter dependent spatial inhomogeneity are provided. The appearance and disappearance of the multiple transition layer is analyzed as well. We treat the unbalanced and balanced settings separately due to the fact that in higher dimensions the motion law of the sharp interfaces differs significantly, as one is an algebraic equation while the other is a PDE involving the mean curvature of the interface. This is joint work with Aaron Yip. (Received September 10, 2010)