

# Oval shaped droplet solutions in the saturation process of some pattern formation problems

Xiaofeng Ren

*The George Washington University, USA*

The first stage in the transition from a coarse structure to a fine structure in many pattern formation problems involves the change of a standard geometric object such as a round disc to a less standard geometric object such as an oval shaped set. On a generic domain two small oval shaped sets are found as solutions to a nonlocal geometric problem. This problem arises as the singular limit of both the Ohta-Kawasaki theory for diblock copolymers and the Gierer-Meinhardt theory for morphogenesis in cell development. The two sets have the same center which is a global minimum of the diagonal of the regular part of a Green's function. This minimum point may be regarded as a kind of center of the domain. Moreover the second derivatives of the regular part of the Green's function define a major axis and a minor axis for the domain. One of the oval shaped solutions is stable and it aligns itself along the major axis. The other oval shaped solution is unstable and is parallel to the minor axis.