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**Xiaofeng Ren\*** ([ren@gwu.edu](mailto:ren@gwu.edu)), 2115 G Street, NW, Monroe Hall, Room 240, Washington, DC 20052. *Ansatz solutions to a problem of mean curvature and Newtonian potential.*

Pattern formation problems arise in many physical and biological systems as orderly outcomes of self-organization principles. Examples include animal coats, skin pigmentation, and morphological phases in block copolymers. Recent advances in singular perturbation theory and asymptotic analysis have made it possible to study these problems rigorously. In this talk I will discuss a central theme in the construction of various patterns as solutions to some well known PDE and geometric problems: how a single piece of structure built on the entire space can be used as an ansatz to produce a near periodic pattern on a bounded domain. We start with the simple disc and show how the spot pattern in morphogenesis and the cylindrical phase in diblock copolymers can be mathematically explained. More complex are the ring structure and the oval structure which can also be used to construct solutions on bounded domains. Finally we discuss the newly discovered smoke-ring structure and the toroidal tube structure in space. (Received January 25, 2011)