1067-92-2303 **Kara T Pham*** (karap@math.uci.edu), Department of Mathematics, 340 Rowland Hall, Irvine, CA 92697, and **Hermann B Frieboes**, **Vittorio Cristini** and **John Lowengrub**. *Predictions of tumor morphological stability and evaluation against experimental observations.*

The hallmark of malignant tumors is their invasion of local tissue and infiltration of distant organs (metastasis). A defining characteristic of aggressive tumors is an unstable morphology, including invasive fingers and protrusions. Shape instabilities (growing protrusions) are associated with local invasiveness, also often a precursor to tumor metastasis. We study tumor morphological stability by employing three mathematical models to gain insight into tumor invasion and metastasis. We consider three constitutive relations to describe tumor growth: Darcy's law, Stokes law, and the combined Darcy-Stokes law. Darcy's law is used to describe fluid flow in a porous medium. Stokes flow describes the flow of a viscous fluid. Using linear theory, we study the tumor morphological stability described by each model and evaluate the consistency between theoretical model predictions and experimental data from in vitro 3D multicellular tumor spheroids. We will discuss the results and further show that it is feasible to extract parameter values from a limited set of data and create a self-consistent modeling framework that can be extended to the multiscale study of cancer. Numerical methods are used to simulate the nonlinear effects of stress on solid tumor growth and invasiveness. (Received September 22, 2010)