

Free boundary problems arising in mathematical biology

By Avner Friedman

This talk will describe recent free boundary problems that arise in models of biological processes. We begin with cancer models, where the region occupied by the cancer is one of the unknowns. Already quite simple models give rise to systems of elliptic-parabolic-hyperbolic equations. There are a number of results regarding existence of time-dependent solutions, and existence of stationary spherical and non-spherical solutions, but the general case is far from resolved, with many challenging problems still open. We shall describe other free boundary problems which arise in models of healing of wounds. Here the viscoelastic nature of the healing tissue plays a critical role. Chronic wounds, in particular, remain a challenging research problem especially in dimensions 2 and 3.