PDES MODELLING CELL BLEBBING WITH MEMBRANE-CORTEX INTERACTION THROUGH LINKER PROTEINS

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It has been observed that the membrane of some eukaryotic cell types like tumor or primordial germ cells occasionally unbinds from the cell cortex and deforms showing protrusions that look like blebs. This occurs during important biological processes such as apoptosis or cytokinesis and is also employed as migration mechanism by certain cells. For description of the membrane shape deformation, a fourth order semilinear PDE on a 2D real manifold in 3D space is derived. We first establish existence and uniqueness of weak solutions before dealing with stationary states and their stability. As our model is non-standard in several ways, we also compare against existing models for cell blebbing both analytically and numerically. We also investige how the problem may be approached with phase field methods and point out some interesting relations between both models.