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Mathematical Models for Mesenchymal Motion

Mesenchymal motion is a form of cellular movement that occurs in three-dimensions through tissues formed from fibre networks, for example the invasion of tumor metastases through collagen networks. The movement of cells is guided by the directionality of the network and in addition, the network is degraded by proteases. I derive mathematical models for mesenchymal motion in a timely varying network tissue. The models are based on transport equations and their drift-diffusion limits. It turns out that the mean drift velocity is given by the mean orientation of the tissue and the diffusion tensor is given by the variance-covariance matrix of the tissue orientations. I will discuss relations to existing models and future applications.