On the shape of invading population in oriented environments

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The properties of population spreading in environments with spatial anisotropy are analyzed within the frames of a lattice model of asymmetric (biased) random walkers. The expressions for the universal shape characteristics of the instantaneous configuration of population, such as asphericity A and prolateness S are found analytically and proved to be dependent only on the asymmetric transition probabilities in different directions. The model under consideration is shown to capture, in particular, the peculiarities of invasion in presence of an array of oriented tubes (fibers) in the environment.