

Cellular automaton modelling of pattern formation in interacting cell systems

A. Deutsch, U. Börner, and M. Bär

Abstract

Cellular automata can be viewed as simple models of spatially extended decentralized systems made up of a number of individual components (e.g. biological cells). The communication between constituent cells is limited to local interaction. Each individual cell is in a specific state which changes over time depending on the states of its local neighbors. In particular, cellular automaton models have been proposed for biological applications including ecological, epidemiological, ethological (game theoretical), evolutionary, immunobiological and morphogenetic aspects. Here, we present an overview of cellular automaton models of spatio-temporal pattern formation in interacting cell systems. Finally, we focus on a specific example – rippling pattern formation in myxobacteria and introduce a cellular automaton model for this phenomenon which is able to lead to testable biological hypotheses.