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**Re-entrant phase transition in a one-dimensional growth model**

**Abstract**

We introduce a Markov process in the space of semi-infinite strings made of two types of particle, whose dynamics imitates that of microtubules. The long term behaviour of the model is described in terms of the velocity of the "active end", which is an analytic function of the jump rates. The model exhibits a phase transition in that in some part of the parameter space the velocity possesses natural monotonicity properties, while in another region that monotonicity does not hold; in particular, increasing the local shrinking rate leads to a faster global growth.