

Asymptotic Behavior for a Generalized Domany-Kinzel Model

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Abstract: We consider a generalized Domany-Kinzel model such that vertical edges are directed upward with probability p_1 and p_2 in alternate rows, and horizontal edges are directed rightward with probabilities one. Let $\tau(M, N)$ be the probability that there is at least one connected-directed path of occupied edges from $(0, 0)$ to (M, N) . In this talk I present that for each $p_1 \in [0, 1]$, $p_2 \in [0, 1]$, but $p_1 \vee p_2 > 0$, $p_1 \wedge p_2 < 1$ and aspect ratio $\alpha = M/N$ fixed for the square lattice, there is an $\alpha_c = (2 - p_1 - p_2)/(p_1 + p_2)$ such that as $N \rightarrow \infty$, $\tau(M, N)$ is 1, 0 and $1/2$ for $\alpha > \alpha_c$, $\alpha < \alpha_c$ and $\alpha = \alpha_c$, respectively. Moreover, I also present the rate of convergence of $\tau(M, N)$ and the asymptotic behavior of $\tau(M_N^-, N)$ and $\tau(M_N^+, N)$ where $M_N^-/N \uparrow \alpha_c$ and $M_N^+/N \downarrow \alpha_c$ as $N \uparrow \infty$. This is a joint work with Shu-Chiuan Chang and Chien-Hao Huang.