Asymptotic Behavior for a Generalized Domany-Kinzel Model

Lung-Chi CHEN Department of Mathematical Sciences, National Chengchi University, Taiwan,
E-mail: lcchen@nccu.edu.tw

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 $(M; N)$ 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 $p_1 \in [0, 1], p_2 \in [0, 1], p_1 \lor p_2 > 0, p_1 \land p_2 < 1$ 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 $N \to \infty$, $(M; N)$ 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.