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Phase diagram and critical exponents for the pair annihilation model in one and two dimensions ADRIANA DICKMAN, Pontifcia Universidade Católica de Minas Gerais, RONALD DICKMAN, Universidade Federal de Minas Gerais — We study the one and two-dimensional pair annihilation model (PAM) with diffusion using the pair approximation (PA) and Monte Carlo simulation. The model is defined on a d-dimensional hypercubic lattice where sites can be either occupied by a particle or vacant. The particles are allowed to diffuse with probability D; pairs of particles are annihilated with rate 1, and particles are created with rate $n\lambda/(2d)$, where n is the number of occupied neighbors. The active and absorbing phases are separated by a continuous phase transition at $\lambda_c(D)$. We obtain the phase diagram and critical exponents for the model, which confirm that PAM belongs to the directed percolation (DP) universality class. The PA for the one and two-dimensional PAM indicates that for a diffusion rate greater than a certain value, $\lambda_c = 0$. On the other hand, Katori and Konno [Katori, K., and Konno, N. (1992). Physica A **186**, 578] showed rigorously that $\lambda_c > 0$ for any diffusion rate, in one dimension. Our simulation results are consistent with this theorem, but suggest that the PA prediction is correct in two dimensions.

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