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Critical phenomena of Site-Percolation Models with Two Different Sizes of Particles on a Square Lattice RYOJI SAHARA, HIROSHI MIZUSEKI, Institute for Materialas Research, Tohoku University, KIYOSHI KANIE, ATSUSHI MURAMATSU, Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, YOSHIYUKI KAWAZOE, Institute for Materialas Research, Tohoku University, IMR, TOHOKU UNIVERISITY TEAM — The concept of percolation plays an important role in explaining various important physical phenomena, including transport, mechanical, and electromagnetic properties of disordered systems. To date, many percolation models have been developed. Contrary to the ordinary site percolation models with homogeneous particles, systems have a certain particle-size distribution. Such a distribution may affect the properties of the system in certain ways. In the present study, site-percolation models with two different sizes of particles are systematically introduced on a square lattice to understand the effect of nonhomogeneity of the particles in the system. To estimate the critical phenomena with high accuracy, a finite-size scaling analysis is performed with a Monte Carlo simulation. The critical coverage at the percolation threshold is examined as a function of the size distribution of elements in the system. Fractal dimension and the critical exponentials are also estimated.

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