"Explosive percolation" Transition is actually Continuous
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We present the theory of explosive percolation. Recently a discontinuous percolation transition was reported in a new "explosive percolation" problem for irreversible systems [D. Achlioptas, R. M. D'Souza, and J. Spencer, Science 323, 1453 (2009)] in striking contrast to ordinary percolation. We show that the "explosive percolation" transition is actually a continuous, second order phase transition though with a uniquely small critical exponent of the percolation cluster size. Thus there is no explosion at the "explosive percolation" transition.

Using a wide class of representative models, we describe the unusual scaling properties of this transition and find a set of its scaling functions and critical exponents and dimensions. In particular, we find that the upper critical dimensions for such phase transitions are remarkably low.


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