A rejection-free Monte Carlo method for the hard-disk system HIROSHI WATANABE, Department of Complex, Systems Science, Graduate School of Information Science, Nagoya University, SATOSHI YUKAWA, Department of Applied Physics, School of Engineering, The University of Tokyo, MARK A. NOVOTNY, Department of Physics & Astronomy, ERC Center for Computational Sciences, Mississippi State University, NOBUYASU ITO, Department of Applied Physics, School of Engineering, The University of Tokyo — We construct a rejection-free Monte Carlo method for the hard-disk system. Rejection-free Monte Carlo methods preserve the time-evolution behavior of the standard Monte Carlo method, and it is confirmed for our method by observing nonequilibrium relaxations of a bond-orientational order parameter. The rejection-free method obtains much better performance than the standard method at high densities with new optimization methods to calculate a rejection probability and to update the system. This method should allow an efficient study of the dynamics of two-dimensional solids at high density.

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