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Modified Transition Matrix Methods[1] DAVID YEVICK, MICHAEL REIMER, BJARNE TROMBORG, University of Waterloo — Recently we adapted the transition matrix Monte-Carlo method to general communication systems problems [D. Yevick and M. Reimer, Photon.Technol. Lett. 1529 (2007), IEEE Trans. Commun., submitted, (2007)]. In this presentation, we compare the accuracy and parameter dependence of different multicanonical and transition-matrix methods. We find that the standard multicanonical method can be reformulated more simply and accurately for a single system observable (output variable) within a transition matrix formulation by constructing the intermediate probability density function (density of states) after a small number of Markov transitions from the ratios of the elements of the transition matrix between adjacent histogram bins. Further, we consider an alternative procedure in which transitions only occur either from a given state to itself or to states that have previously been less frequently sampled. Here we show that the numerical error is small unless the self-transition probability is considerable. In this case, despite the violation of detailed balance, numerical precision can be effectively restored by ensuring that the random walker thermalizes within each histogram bin before effecting a transition to a different bin.

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