

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Enhanced Transition Matrix Methods¹ DAVID YEVICK, University of Waterloo, MICHAEL REIMER, University of Waterloo — Recently we have adapted the transition matrix Monte-Carlo method to general communication systems [IEEE Photon.Technol. Lett. 1529 (2007), IEEE Communications Letters, 755 (2008)]. In these studies we compared and integrated different multicanonical and transition-matrix methods. We determined that the standard multicanonical method can be reformulated more simply and accurately 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 states. Further, we considered an algorithmically more simple procedure in which transitions only occur from a given state to another state that has previously been less frequently sampled. Here we found that while substantial errors often result if the perturbation that links adjacent Markov states is small, numerical accuracy can be restored by restricting the Markov chain to within a single histogram bin for a certain number of transitions before allowing transitions to other bins. We finally summarize our application of these procedures to several problems in optical and wireless communication theory.

¹Funding for this work was provided in part by NSERC and Nortel.

David Yevick
University of Waterloo

Date submitted: 21 Nov 2008

Electronic form version 1.4