

Accepted Manuscript

An Efficient Method for Simulation of Noisy Coupled Multi-Dimensional Oscillators

Adam R. Stinchcombe, Daniel B. Forger

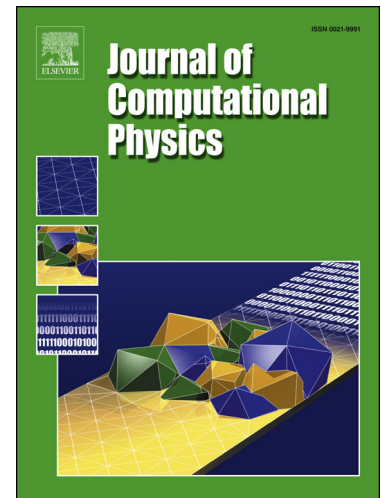
PII: S0021-9991(16)30162-0
DOI: <http://dx.doi.org/10.1016/j.jcp.2016.05.025>
Reference: YJCPH 6622

To appear in: *Journal of Computational Physics*

Received date: 27 August 2015
Revised date: 11 May 2016
Accepted date: 11 May 2016

Please cite this article in press as: A.R. Stinchcombe, D.B. Forger, An Efficient Method for Simulation of Noisy Coupled Multi-Dimensional Oscillators, *J. Comput. Phys.* (2016), <http://dx.doi.org/10.1016/j.jcp.2016.05.025>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



An Efficient Method for Simulation of Noisy Coupled Multi-Dimensional Oscillators

Adam R. Stinchcombe^{a,*}, Daniel B. Forger^a

^a*Department of Mathematics, University of Michigan
2074 East Hall, 530 Church Street, Ann Arbor, MI 48109-1043*

Abstract

We present an efficient computational method for the study of populations of noisy coupled oscillators. By taking a population density approach in which the probability density of observing an oscillator at a point of state space is the primary variable instead of the states of all of the oscillators, we are able to seamlessly account for intrinsic noise within the oscillators and global coupling within the population. The population is assumed to consist of a large number of oscillators so that the noise process is well sampled over the population. Our numerical method is able to solve the governing equation even in the challenging case of limit cycle oscillators with a large number of state variables. Instead of simulating a prohibitive number of oscillators, our particle method simulates relatively few particles allowing for the efficient solution of the governing equation.

Keywords: coupled oscillators; particle method; population density approach; stochastic simulation

2010 MSC: 34C15, 65M75

*Corresponding author: Phone: (734) 763-4703
Email addresses: stinch@umich.edu (Adam R. Stinchcombe), forger@umich.edu (Daniel B. Forger)

Download English Version:

<https://daneshyari.com/en/article/6929847>

Download Persian Version:

<https://daneshyari.com/article/6929847>

[Daneshyari.com](https://daneshyari.com)