

Ladd, Anthony J. C.

A fast random number generator for stochastic simulations. (English) Zbl 1197.65009
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Summary: A discrete random number (DRN) generator for stochastic differential equations is proposed. The generator has exactly 8 states and thus 10 DRN's can be obtained from a single 32-bit random variable. This is advantageous when large numbers of DRN's are needed, as for example in fluctuating lattice-Boltzmann models. The moments of the discrete distribution match those of a Gaussian distribution (zero mean and unit variance) up to 5th order. Numerical tests show that satisfactory statistical properties can be obtained with several 32-bit pseudo random number (PRN) generators.

MSC:

65C10 Random number generation in numerical analysis

Cited in 1 Document

Keywords:

random number generators

Software:

Diehard; dieharder

Full Text: [DOI](#)

References:

- [1] Dünweg, B.; Paul, W., *Int. J. mod. phys. C*, 2, 817, (1991)
- [2] Öttinger, H.C., *Stochastic processes in polymeric fluids*, (1996), Springer-Verlag
- [3] Kloeden, P.E.; Platen, E., *Numerical solution of stochastic differential equations, Applications of mathematics*, vol. 23, (1993), Springer · [Zbl 0701.60054](#)
- [4] Ladd, A.J.C., *Phys. rev. lett.*, 70, 1339, (1993)
- [5] Adhikari, R.; Stratford, K.; Cates, M.E.; Wagner, A.J., *Europhys. lett.*, 3, 473, (2005)
- [6] Dünweg, B.; Ladd, A.J.C., *Adv. polym. sci.*, 221, 89, (2009)
- [7] Dünweg, B.; Schiller, U.D.; Ladd, A.J.C., *Comput. phys. commun.*, 180, 605-608, (2009)
- [8] Buchmann, F.M.; Petersen, W.P., *BIT numer. math.*, 43, 519, (2003)
- [9] Free Software Foundation, *GSL - GNU Scientific Library - Version 1.12*
- [10] Ziff, R.M., *Comput. phys.*, 12, 385, (1998)
- [11] Marsaglia, G., *Diehard: battery of tests of randomness*
- [12] Marsaglia, G., *J. stat. soft.*, 14, (2005)
- [13] Brown, R.G., *Dieharder: A random number test suite - version 2.28.1*
- [14] Vattulainen, I.; Ala-Nissila, T.; Kankaala, K., *Phys. rev. E*, 52, 3205, (1995)

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