Simulating Particle Travel With Lattice Computers (Preliminary Report)

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Keywords: Massive parallelism, lattice computer, real-time simulation, particle motion.

Abstract

One can approximate euclidean n-space by an n-dimensional geometric lattice. A bounded, connected, and convex region of eucldean n-space can be approximated by its intersection with the lattice, and one can naturally associate a lattice computer with this intersection: put synchronized processors centered on the lattice points of the intersection and connect all and only the (euclidean) nearest neighbors among these processors by identical, bidirectional communication channels.

An algorithm template is presented for (approximately) real-time *analogical* simulation, in such lattice computers, of constant speed particle motion in euclidean n-space, *and* a particular instance of the template is refined for constant speed straight-line particle motion. Discussed are the possibilities of using this algorithm for simulating constant speed solid body motion and the possible utility of this algorithm for circumventing, in a new way, the difficulties, pointed out by Frisch and Hasslacher, in simulating 3-dimensional fluid flow in lattice gas cellular automata.

*Research supported in part by NSF Grant CCR 8713846 at the University of Delaware.
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