

Large-scale Polytope Diameter Experiments using the CBE Processor:  
Towards a Resolution to Hirsch's Conjecture

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With the release of the Cell Broadband Engine-based Playstation 3 in November 2006, a low-cost vector processor has become available to the research community for high-performance computing and combinatorial experiments. To demonstrate its effectiveness, we are using the Cell Processor to search for a counterexample to Hirsch's conjecture in its  $d$ -step form, an important open question in the theory of optimization. We present results on the generation and analysis of  $2^{25}$  random  $d$ -regular graphs per day with up to 112 vertices.

Our implementation of the Floyd-Warshall (FW) algorithm has a peak performance of 56 GIPS on the Cell processor with almost linear speedup on the 6 vector processing elements, exceeding previous performance benchmarks by a factor of 18. This demonstrates that the CBE can be an effective supercomputing platform for attacking graph-based combinatorial challenges.