

# Meeting on Modern Aspects of Analysis and Scientific Computing

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## Abstract of Talk

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### **MORTON ORDERING OF 2D ARRAYS FOR PARALLELISM AND EFFICIENT ACCESS TO HIERARCHICAL MEMORY**

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This talk describes the recursive Morton ordering that supports efficient access to hierarchical memory across a range of heterogeneous computer platforms, ranging from many-core devices, multi-core processor, clusters, and distributed environments. Programmer-level control of the memory hierarchy is also considered. A brief overview of previous research in this area is given, and algorithms that make use of Morton ordering are described. These are then used to demonstrate the efficiency of the Morton ordering approach by performance experiments on different processors. In particular, timing results are presented for matrix multiplication, Cholesky factorisation, and fast Fourier transform algorithms. The use of the Morton ordering approach leads naturally to algorithms that are recursive, and exposes parallelism at each level of recursion. Thus, the approach advocated in this talk not only provides convenient and efficient access to hierarchical memory, but also provides a basis for exploiting parallelism.