

## **Patch-based Computing for Large Scale Unstructured Mesh Applications**

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**ABSTRACT** A patch-based data structure is presented here for large scale unstructured mesh simulations. According to the data structure, computational domain is divided into some groups of patches, and each group is assigned to one processor. Based on the data structure, two-level parallelism using MPI and OpenMP can be implemented easily. Further, the communication pattern for neighboring patches is presented. The programming interface of the data structure is designed so that application experts can easily develop programs which can run on thousands of cores efficiently. Numerical results show that such data structure is well suitable for unstructured mesh simulation on multi-core parallel computer, and it can support the design of object-oriented unstructured mesh infrastructure.