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*Development of a Parallelizable Implementation of the Vorticity Transport Model*

**Abstract:**

The Vorticity Transport Model (VTM) modifies the Navier-Stokes equation and solves for the unsteady transport equation for vorticity. It then discretizes and solves this equation along with the Biot-Savart relationship to conservatively advect vorticity throughout a domain. A significant component of the algorithm involves domain decomposition using an octree structure. The octree provides for recursive grid refinement as well as a useful context for implementation of a Fast Multipole Method (FMM) for the purposes of calculating the Biot-Savart relationship. It is proposed that the octree domain structuring provides a ready-made framework for the implementation of a parallelizable computational approach that should provide significant scalability on cluster and grid computational platforms.

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