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Ling Xu*, 530 Church Street, 2074 East Hall, Ann Arbor, MI 48109, and **Robert Krasny**, 530 Church Street, 2074 East Hall, Ann Arbor, MI 48109. *An efficient particle vortex method for vorticity dynamics in free space.* Preliminary report.

We present an efficient particle vortex method for directly simulating the fluid flow motion in free space. The method employs techniques to accelerate the computation (adaptive mesh refinement and MPI parallelism) and maintain the accuracy and stability of the solutions (vorticity remeshing, high order interpolation). For the case of inviscid flow, a comparison to the inviscid elliptic dipole computation is made to validate the method. For the viscous case, some preliminary results will be presented. (Received September 07, 2016)