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Data Assimilation for Improved Point-Vortex Models[1] NATALIE ROSS, ELIZABETH BRADLEY, JEAN HERTZBERG, University of Colorado, Boulder, THOMAS PEACOCK, MIT — Most flow simulation methods, though accurate, are still too slow for real time applications. In contrast, a point-vortex solver tracks only the vortices in the flow, providing speed at the cost of over-simplification. Periodically correcting the model with observations of the fluid, a process known as data assimilation, could result in a simulation that is both fast *and* accurate if the assimilation is effective and its computational costs are low. Most existing data assimilation methods, however, have been developed in the context of highly complex atmospheric and oceanic applications, such as numerical weather prediction. Results show that one of the simplest of these schemes, Newtonian Nudging, can actually be *detrimental* to a smaller scale point-vortex simulation. We present an alternative assimilation strategy that allows the dynamics of the system to dictate when corrections are required. Data is assimilated *only* in regions where gradients are relatively large, permitting a significant reduction in computational cost as compared to periodic correction. In initial experiments, we were also able to increase the accuracy of the simulation by a factor of two.

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