Discretization of the Vorticity Field of a Planar Jet NATALIE
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Boulder — When initializing a vortex method simulation of a flow, typically vortexes
are placed on a rectangular grid. Here, in the context of a data assimilation scheme,
we seek to model a flow using far fewer vortexes than grid points. The flow was a
planar jet which was excited into a small number of vortexes arranged in a street
configuration. Velocity data was acquired using particle image velocimetry, provid-
ing a well-resolved vorticity field. Two standard vortex extraction techniques were
applied, vorticity thresholding and Okubo-Weiss. These techniques were modified
using a 'connected component' technique from computational topology to determine
the boundaries of the vortexes. One or several point vortexes were then placed inside
each boundary. The results were analyzed by comparing the velocity fields induced
by the point vortexes to the original velocity field. Thresholding was found to give
comparable results to Okubo-Weiss, with far lower computational cost.

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