The role of noise in two-dimensional vortex merging

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All numerical, and some experimental studies of merging of two-dimensional vortex patches point at the existence of a critical initial distance of separation below which merging occurs and above which it does not. Some other laboratory experiments, however, report no such marked sensitivity of merging behaviour on the initial distance of separation. We study the effects of noise, which is one of the possible causes of the above mentioned difference, on vortex merging. We find that noise accelerates merging, and the time needed for merging decreases nearly linearly with increasing noise for high noise levels. However, the level of noise required for merging within the advection time scale is higher than what is usually found in "clean" wind tunnels or water tanks, and thus the presence of noise in laboratories is not the sole cause of the above difference.

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