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Impact of Karlovitz number on vortex evolution through a premixed flame CHRIS BRADLEY, BROCK BOBBITT, GUILLAUME BLANQUART, California Institute of Technology — As a canonical test case of premixed turbulent combustion, the vortex-flame interaction is investigated for the transformation of vorticity through the flame. This is analyzed as a function of the length and velocity scale of the vortex, which may be related to the Karlovitz number in premixed turbulent combustion. This analysis is performed using theoretical analysis of the vorticity equation and results from Direct Numerical Simulations. The vorticity is found to transform with different behavior due to the variable importance of viscous dissipation, dilatation, and baroclinic torque. The importance of these effects are shown to be based on the velocity and length scale of the vortex in relation to the velocity and length scale of the flame. The conditions under which these effects are dominant is outlined and confirmed through comparison of the theoretical and simulation results.

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