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Dynamics of Near Limit Diffusion Flames at Elevated Pressures and Temperatures YIGUANG JU, ERIC LIN, CHRISTOPHER REUTER, Princeton University — The effects of cool flame chemistry and thermal radiation on the flame regimes and flammabilility limits of diffusion flames at elevated pressures and temperatures on dimethyl ether/air mixtures have been examined numerically. Three different flame regimes, cool flames, mild flames, and hot flames, are found. For near limit flames, the hot flames are bounded by a radiation extinction limit and a stretch extinction limit. The mild flame has a stretch extinction limit at high stretch rate. The cool flames have a reignition limit at low stretch rates and a stretch extinction limit at high stretch rate. Both pressure and temperature have significant impact on the flame regimes and their flammable regions. A new near limit diffusion flame flammability diagram, which includes all three flame regimes, is obtained.

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