1077-76-1864 **Joseph E Hibdon, Jr*** (jhibdon@gmail.com), 1208 Hull Terrace, Apt#3, Evanston, IL 60202, and **Moshe Matalon**, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801. *Effect of Gravity in Diffusive Thermal Instabilities of Diffusion Flames.*

Non-premixed or diffusion flames are the type of flames observed in multiple systems from a relatively simple candle flame or the complexities of a forest fire. With an increase in populations that are moving into areas prone to forest fires and an increase to have more efficient furnaces, understanding the effect the environment has on diffusion flames is essential. To have a better understanding of how these flames behave we examine the effect of convection and gravity on diffusive thermal instabilities. The configuration adopted is the planar unstrained flame with a bulk flow directed toward the reaction zone from either the fuel or the oxidizer sides. The model also allows for the no bulk flow case, where the reactants reach reaction zone purely by diffusion. Diffusive-thermal instabilities were examined for several limiting cases. In the absence of a flow and no gravity the only mode of instability observed are planar oscillations, when convective flow is introduced a general increase in the frequency of the oscillations occurs. The addition of gravity in the absence of a convective flow leads to cellular instabilities where unconditionally stable flames persist otherwise and has a relatively minor effect on diffusive-thermal instabilities with a convective flow. (Received September 21, 2011)