1046-34-104 **Benjamin Baxter*** (baxterb2@nku.edu), 1322 Boat Run Lane, New Richmond, OH 45157, and **Lisa J Holden** (HOLDENL@nku.edu), Department of Mathematics, Northern Kentucky University, Nunn Drive, Highland Heights, KY 41099. *Examining the Evolution of Molecular Gas in the Interstellar Medium: The Case of the Singular Ordinary Differential Equations.* Preliminary report.

We consider the collapse and/or wind solutions of a self-gravitating cylindrically symmetric gas. The situation is described by a set of partial differential fluid equations. These equations allow for a self-similar analysis, enabling us to reduce the system to a set of ordinary differential equations. Previous studies have described an "inside-out" collapse solution for certain regions of parameter space. We focus on constructing solutions that cross singular points smoothly. After identifying the surface on which the differential equations become singular, we impose conditions such that the solutions will not diverge as they cross the resulting critical curve. We then obtain a Taylor series expansion of our analytic solution valid in a neighborhood about the critical point. Integrating both outward and inward from the critical point, we obtain a global solution. Finally, we consider our results in the context of star formation. (Received July 23, 2008)