Rarefaction Waves in Van der Waals Fluids\textsuperscript{1} ALBERT YUEN, UC Berkeley - LBNL, JOHN BARNARD, RICHARD MORE, LBNL — As the simplest description of material that exhibits a liquid-vapor two-phase state, the Van der Waals' fluid model can be used to obtain qualitative (and sometimes quantitative) information about the fluid dynamics of material in the two-phase regime. We apply the general one-dimensional self-similar solution of a rarefaction wave in an initially semi-infinite liquid, uniform in temperature and density, to the specific case of a Van der Waals’ fluid. We obtain a set of profiles for the fluid density, temperature and velocity, that describes the fluid for a wide range of space, time, initial conditions, and Van der Waals’ parameters. These results may be used to interpret experiments in which a material is rapidly isochorically heated. In particular, “plateaus” in temperature and density as a function of position are observed characterizing entrance into the two-phase regime.

\textsuperscript{1}Work performed under the auspices of the U.S. Department of Energy under contract DE-AC52-07NA27344 at LLNL, and University of California contract DE-AC02-05CH11231 at LBNL.

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Date submitted: 11 Jul 2011

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