

F2 Kinetic Theory of Evaporation and Condensation Between Parallel Plates. J. R. THOMAS, JR., T. S. CHANG, and C. E. SIEWERT, North Carolina State University.-- Elementary solutions of the coupled pair of integro-differential equations arising from the decomposition of the linearized BGK equation in the kinetic theory of gases are used to solve the problem of evaporation and condensation between parallel surfaces of a condensed ¹ phase. A coupled pair of Fredholm equations is derived, and accurate solutions are constructed by iteration. These solutions are then used to obtain accurate values of the heat and mass fluxes between the surfaces and the temperature and density profiles for various values of δ , the inverse Knudsen number, and β , the slope of the density-temperature curve for a saturated vapor. It is found that for certain (realistic) values of β , the slope of the temperature profile in the vapor is in opposition to the imposed temperature gradient. This result confirms a previously reported approximate treatment of this problem?²

¹J. R. Thomas, Jr., T. S. Chang, and C. E. Siewert, Phys. Fluids (December 1973).

²Y. P. Pao, Phys. Fluids 14, 306 (1971).