

Maxwell-Stefan diffusion limit

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Abstract

In this talk I want to present the formal derivation of the Maxwell-Stefan equations from a system of scaled Boltzmann equations.

For this we consider a multi-species mixture of monoatomic ideal gases with no chemical reactions. Starting from the non-reactive elastic Boltzmann equation for multicomponent gaseous mixtures in a diffusive scaling under the assumption of small bulk velocities, we construct solutions which lead to Maxwell-Stefan equations when the Knudsen and Mach numbers go to zero.

Since our hypocoercivity method uses the same scaling for the kinetic equations as above, further work will be to derive explicit rates for the exponential convergence to equilibrium for the Maxwell-Stefan equations in the vanishing Mach and Knudsen number limit using the method of hypocoercivity.