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Hydrodynamic generator in RTA kinetic theory[1] MIKE MCNELIS, ULRICH HEINZ, Ohio State Univ - Columbus — Weresumthe non-equilibrium gradient corrections to a single-particle distribution function evolved by the Boltzmann equation in the relaxation time approximation (RTA). We first study a system undergoing Bjorken expansion and show that (for a constant relaxation time) the exact solution of the RTA Boltzmann equation at late times generates the Borel resummed Chapman-Enskog series. Extending this correspondence to systems without Bjorken symmetry, we construct a (3+1)-dimensional hydrodynamic generator for RTA kinetic theory, which is an integral representation of the Chapman-Enskog series in the limit of vanishing non-hydrodynamic modes. Relaxing this limit we find at earlier times a set of non-hydrodynamic modes coupled to the Chapman-Enskog expansion. Including the dynamics of these non-hydrodynamic modes is shown to control the emergence of hydrodynamics as an effective field theory description of non-equilibrium fluids, which works well even for far-off-equilibrium situations where the Knudsen number is initially large.

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