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Derivation of the hydrodynamic equation from the quantum transport equation YUTA KIKUCHI, Department of Physics, Kyoto University, KYOSUKE TSUMURA, Analysis Technology Center, Fujifilm Corporation, TEIJI KUNIHIRO, Department of Physics, Kyoto University — The Kadanoff-Baym equation is the quantum transport equation which possesses the microscopic trans- port properties. We derive the hydrodynamic equation as an infrared effective dynamics of the microscopic theory from Kadanoff-Baym equation with the dynamical renormalization group method [1]. As a preparation, we check the validity of the dynamical renormalization group method developed in [2] by comparing with the Chapman-Enskog method discussed in [3]. We consider the unitary Fermi gas system as an example. Next, we derive the hydrodynamic equation including the quantum effect from the Kadanoff-Baym equation. Furthermore, we extend this method to the multi-component system. Finally, we apply the hydrodynamic equation derived here to the unitary Fermi gas system and analyze the transport coefficients of the second order hydrodynamics.

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