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Numerical Simulations of Supercritical Accretion Flows Around a Compact Object

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Rotating plasma forms an accretion disk around compact objects such as black holes and neutron stars. The gravitational energy released during accretion is converted into the kinetic energy, internal energy, and radiation energy. A portion of the converted energy is ejected into interstellar space via outflows and radiation. However, the detailed structure of the accretion disk and the mechanisms driving these outflows are not yet fully understood. In highly luminous systems, such as ultra-luminous X-ray sources, the interaction between the radiation and magnetofluids cannot be ignored and must be properly treated. Therefore, general relativistic radiation magnetohydrodynamics (GR-RMHD) simulations taking into account the effect of the radiation are needed. In this talk, I will present recent numerical studies for GR-RMHD simulations of super-Eddington accretion flows and discuss implications for the accretion dynamics.

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