[구GC-17] Dynamical Friction of Black Hole Pairs at Gas-Rich Galactic Nuclei

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When galaxies merge, their host black holes are believed to coalesce quickly, through gas-dynamical friction, to the point at which gravitational radiation becomes important. A black hole in a binary system certainly experiences dynamical friction due to its own wake as well as due to the wake induced by its companion, but to date little is known about the role of the companion in the coevolution of black hole binaries. We use a semi-analytic approach to study the composite wake due to, and the resulting drag forces on, a point-mass black hole binary orbiting at the opposite sides of the system center in a uniform gaseous medium. Due to the circular orbit, the wake of each black hole becomes asymmetric with a trailing spiral shape, which not only drags the black hole backward but also exerts a positive torque on the companion. The ratio of the positive torque from the companion to the negative torque due to its own wake is ~0.4-0.5 and becomes larger for subsonic cases. This suggests that the orbital decay of black holes in a binary system can take considerably longer than in isolation, especially in the subsonic regime.