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Heating of the Compact X-ray Corona in Seyfert Galaxies[1] YAJIE YUAN, Princeton University; Center for Computational Astrophysics, Flatiron Institute, ANATOLY SPITKOVSKY, Princeton University, ROGER BLANDFORD, DAN WILKINS, KIPAC, Stanford University — There is observational evidence that the X-ray continuum source that creates the broad fluorescent emission lines in some Seyfert Galaxies may be compact and located at a few gravitational radii above the black hole. We consider the possibility that the compact X-ray emitting source may be powered by small scale flux tubes near the black hole that are attached to the orbiting accretion disk. Using three dimensional, time dependent force-free simulations, we find that the field linking the black hole and the disk can get twisted up by the differential rotation to try to form a magnetic tower. When the confinement provided by the field from the outer disk is strong, the forming magnetic tower can quickly become kink unstable, which leads to continuous reconnection and dissipates most of the extracted rotational energy relatively close to the black hole. Such a process may be able to heat up the plasma and produce strong X-ray emission. We estimate the energy dissipation rate and discuss its astrophysical implications.

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