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Kinetic Dissipation of Magnetized Relativistic Astrophysical Momentum Outflow[1] EDISON LIANG, Rice University, MARKUS BOETTCHER, Ohio University, IAN SMITH, Rice University — Many high energy astrophysical phenomena involve relativistic outflows, from pulsar winds, blazar jets to gamma ray bursts. How these objects efficiently convert their outflow momentum and energy into energetic particles and radiation remains one of the outstanding unsolved problems in astrophysics. Since relativistic plasmas are highly collisionless, such dissipation must be studied at the kinetic level. Here we present Particle-in-Cell (PIC) simulations of two specific examples: dissipation of Poynting flux in the context of pulsar equatorial stripe winds, and relativistic shear layers in the context of differentially moving jets. In the former case we show how comoving ponderomotive acceleration can efficiently convert electromagnetic energy and momentum into accelerated particles in an overdense but high a0 (= dimensionless vector potential) plasma. In the latter case we show how relativistic boundary layers develop and energize particles at the expense of outflow momentum shear. We study the dissipation rate as a function of relative Lorentz factor, magnetic field strength and orientation.

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