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Particle-in-cell simulations of electron energization from low Mach number quasi-perpendicular shocks in solar flares[1] ERIC BLACKMAN, JAEHONG PARK, CHUANG REN, University of Rochester, JARED WORKMAN, Colorado Mesa University — Low Mach/high beta fast mode shocks can occur in the magnetic reconnection outflows of solar flares. These shocks, which occur above flare loop tops, may provide electron energization responsible for some of the hard X-rays detected by YOHKO and the RHESSE, and radio emission. There has been a dearth of work on understanding the microphysics of these low Mach number shocks. We present new 2D particle-in-cell simulations of low Mach/high beta shocks for the general quasi-perpendicular geometry of field and shock normal to compare with the results for the purely perpendicular case considered in Park et. al. (2012)[Phys.Plasmas 19,062904]. Our aim is to study shock structure and particle acceleration. We find that the modified-two-stream instability sustains the shock and accounts for the entropy creation downstream. We observe the electron Whistler instability in the transition region due to the temperature anisotropy. To have enough simulation electrons above the threshold energy for shock-drift-acceleration (SDA), we inject a two-temperature Maxwellian distribution represented by two separate species, which is approximated to a kappa distribution with κ=10. From particle tracking and the particle energy distribution, we find copious high-energy electrons experiencing SDA.

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