Effect of shock ripples on electron acceleration and reflection at the quasi-perpendicular bow shock

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At Earth’s bow shock electrons can be reflected and accelerated along magnetic fields lines, which can then form electron beams and excite Langmuir and beam-mode waves. These electron beams form when the shock normal angle is close to 90 degrees. However, recent observations have shown that quasi-perpendicular shocks can be non-stationary and exhibit ripples, which can modify the local shock-normal angle and cross-shock potential. We use Magnetospheric Multiscale (MMS) data to investigate the effects of shock ripples on the accelerated electrons observed in the electron foreshock. We compare the results with test-particle simulations to determine the effect of shock ripples on electron acceleration. We discuss the implications of these results for the generation of plasma frequency waves and radio emission in the electron foreshock region.