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Shock reflection in a magnetized, collisional laboratory plasma[1]
DANNY R RUSSELL, Blackett Laboratory, Imperial College, London, SW7 2AZ, UK, GUY C BURDIAK, THOMAS CLAYSON, First Light Fusion Ltd, Oxford, OX5 1QU, UK, JACK W D HALLIDAY, JACK D HARE, LEE G SUTTLE, SAVVA THEOCHAROUS, SERGEY V LEBEDEV, Blackett Laboratory, Imperial College, London, SW7 2AZ, UK, ERIC BLACKMAN, ADAM FRANK, University of Rochester, Rochester, NY 14627-0171, USA — We present experimental results investigating the reflection of oblique shocks in magnetised, high density plasmas. The shocks are produced by placing multiple obstacles into the supersonic, super-Alfvénic outflow from an ablating inverse wire array z-pinch. The advected magnetic field (5T) is large enough to affect the shock structure via pile-up of the field at the obstacle, which depends on the obstacle size and resistivity and its orientation with respect to the field. The downstream plasma parameters are determined by the compressibility of the magnetic field and two-fluid effects, and we observe a modest density jump by a factor of 2 at the shock. Thomson scattering data show very little heating at the shock when there is magnetic field pile-up, which is consistent with the downstream pressure being provided by the magnetic field. At the oblique shock reflection, magnetic field compression leads to a clear difference in the reflection geometry when compared with experiments with no field pile-up, and an absence of reflected shocks in some geometries.

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