Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Hydraulic jumps and contact lines formed by jet impact on an incline LAURENT LIMAT, ALEXIS DUCHESNE, REMY HERBAUT, LUC LEBON, Matiere et Systemes Complexes (MSC), UMR 7057 of CNRS and Univ. Paris Diderot, Paris, France — We have investigated the shape and stability of hydraulic jumps formed on an inclined plate, around a jet under normal impingement. We have explored three different wetting conditions: total wetting, partial wetting and super-hydrophobicity. In the first case, a strong departure to axisymmetry of the shape is observed, with often disappearance of the lower part of the jump. One also observes the formation of an effective, curved, static contact line around the jump, with a similar horse-shoe structure. Surprisingly, the effective jump radii defined in the directions normal and parallel to the in plane gravity follow quite well Bohr et al scaling, initially proposed for a horizontal, axisymetric jump, but with prefactors dependant on the plate slope. In the partial wetting case, the coupling between the jump and the contact line makes things more complex and Bohr' scaling seems to hold only at large plate slope. In the super hydrophobic case, the structure is strongly axisymmetrical, and reminiscent of sheet atomization. The sheet radius is governed by a balance between surface tension and momentum, itself moderated by the viscous friction on the plate.

Laurent Limat
Matiere et Systemes Complexes (MSC), UMR 7057 of CNRS and
Univ. Paris Diderot, Paris, France

Date submitted: 28 Jul 2013 Electronic form version 1.4