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Computations of Multimaterial Flows in Compressible and Incompressible Flows

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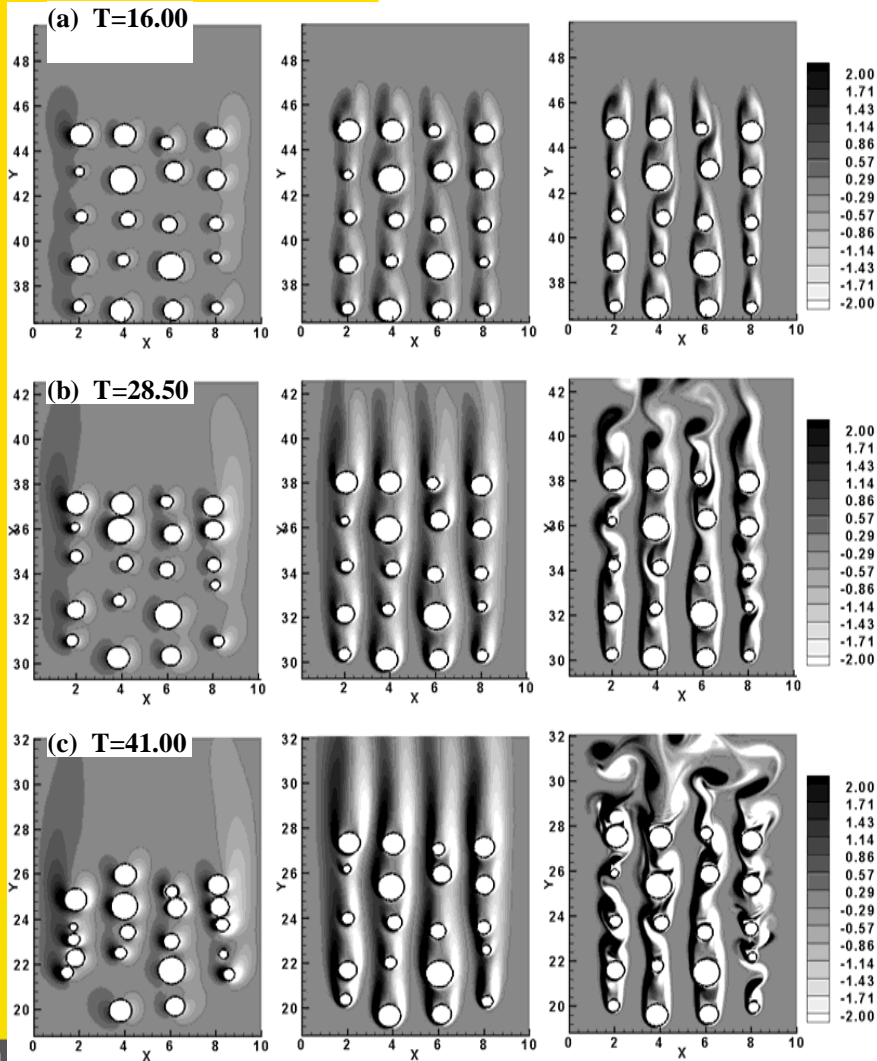
**Supported by AFRL-MNAC, AFOSR Computational
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Particle-laden Flows

Re=10

Re=100

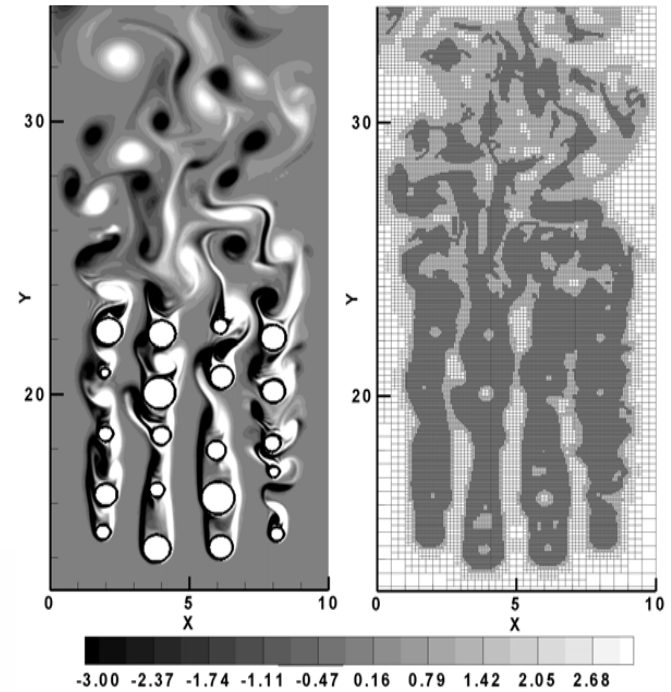
Re=1000



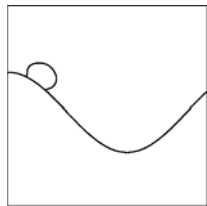
← Settling of particles in fluids
Adaptively refined mesh

(a) Vorticity Contours

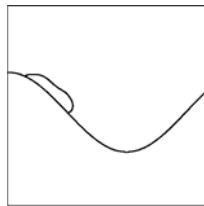
(b) Locally Refined Mesh



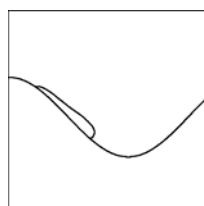
Droplets and Bubbles



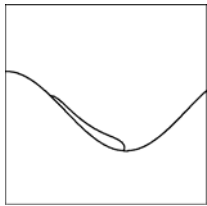
$t^* = 0.8$



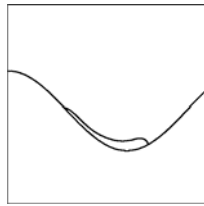
$t^* = 1.7$



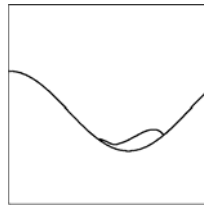
$t^* = 2.2$



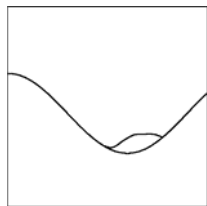
$t^* = 2.8$



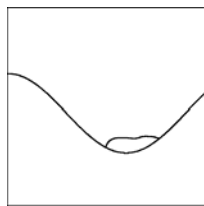
$t^* = 3.2$



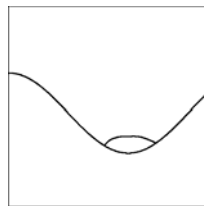
$t^* = 4.3$



$t^* = 4.8$



$t^* = 5.5$



$t^* = 6.5$

Interaction of a droplet
With a solid surface,
including the mechanics
of contact lines

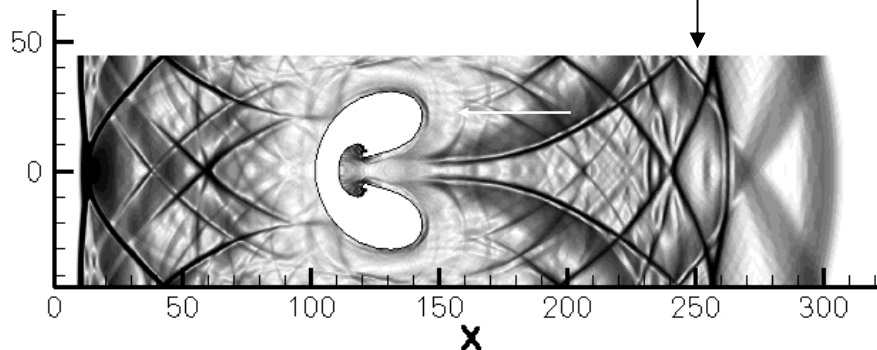
$$Re = 3333$$

$$We = 50$$

$$\theta_{advancing} = 110^\circ$$

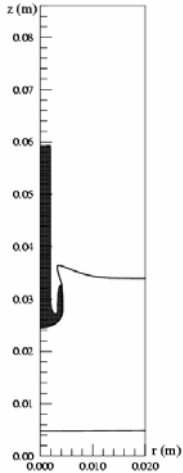
$$\theta_{receding} = 60^\circ$$

Deformation of a bubble
Following interaction with a
shock wave

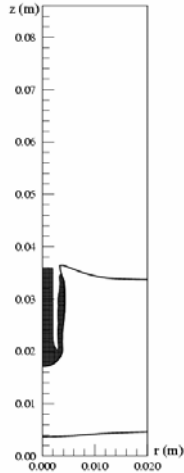


Impact, penetration and collapse

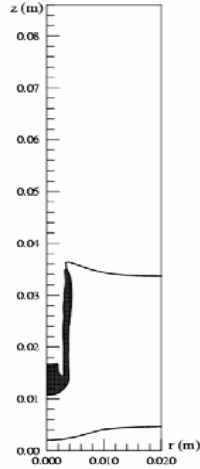
a) 20 μs



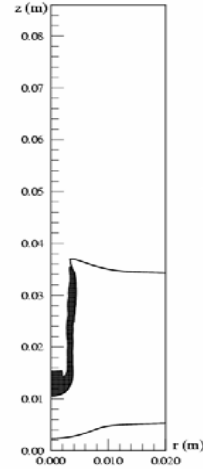
b) 40 μs



c) 60 μs

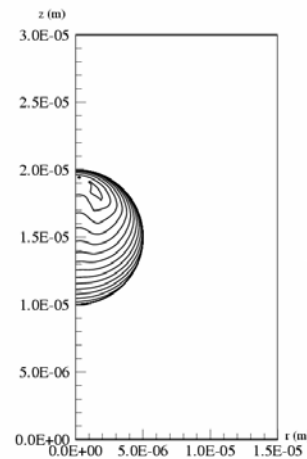
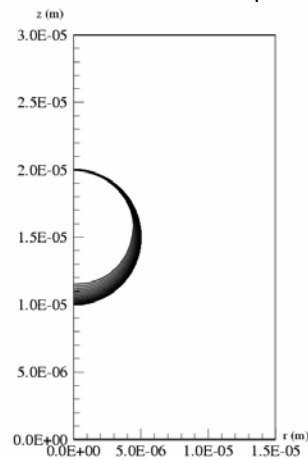


d) 80 μs



Shapes of a tungsten rod penetrating a steel plate with an impact velocity of 1250 m/s.

(a) shock loading $V_p = 50$ m/s (b) shock loading $V_p = 500$ m/s



Evolution of void collapse process in HMX for a 5 micron radius void, elasto-viscoplastic material.