3D Hg Jet Simulation With A Weld

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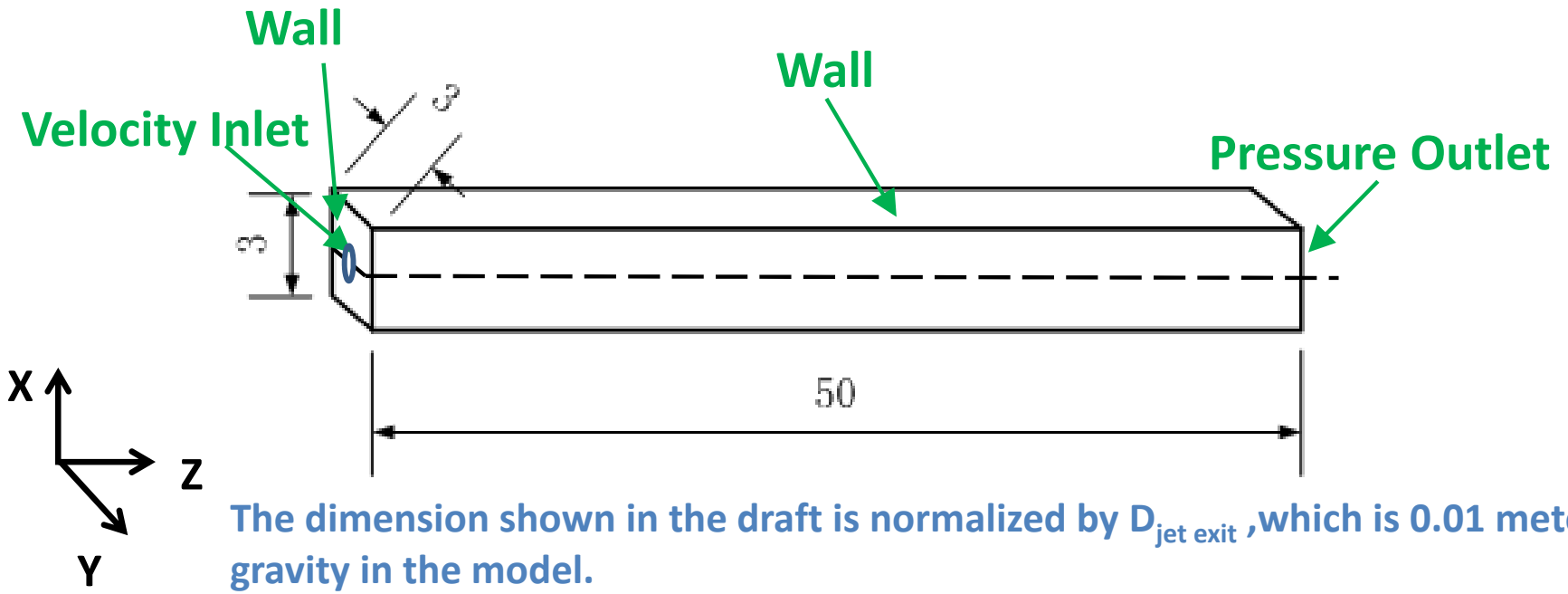
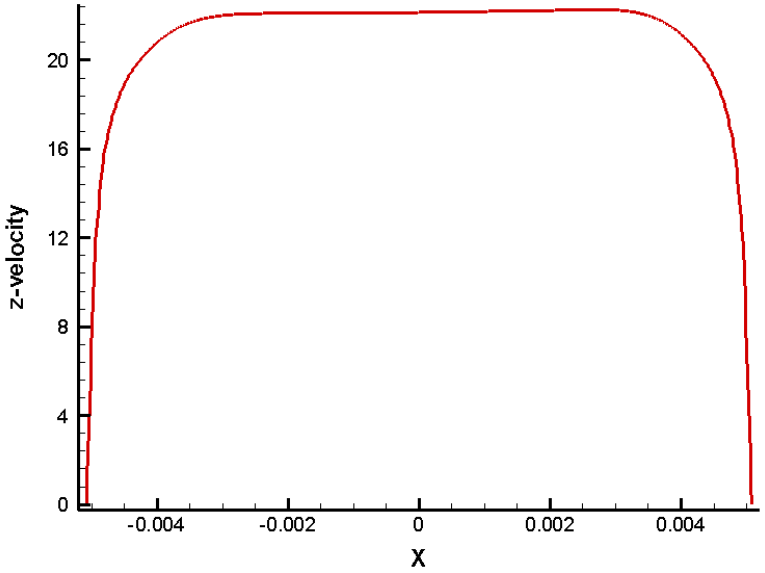
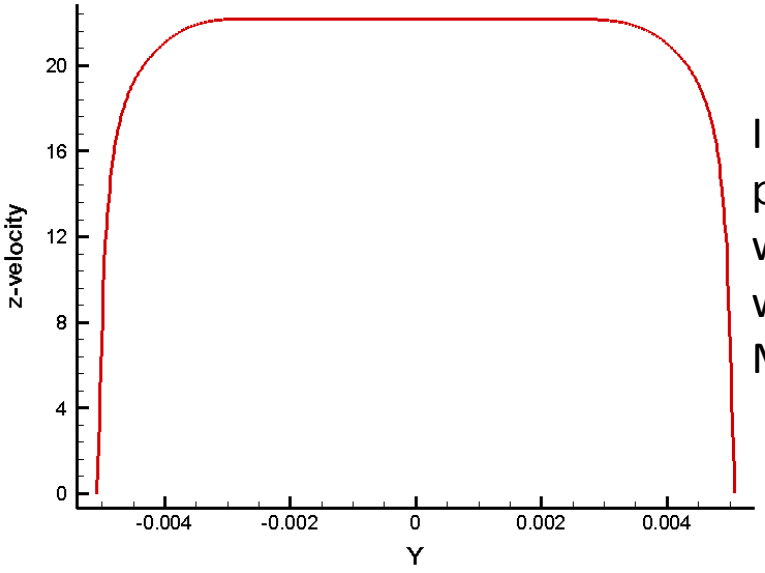
June 6th 2014

Boundary Conditions



The dimension shown in the draft is normalized by $D_{jet\ exit}$,which is 0.01 meter. No gravity in the model.





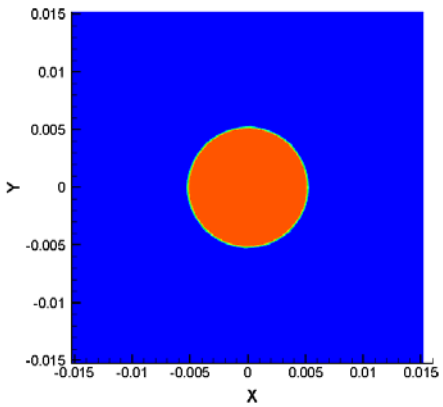
unit: meter

Input at velocity inlet from pipe-flow study with a 30° weld out of bend plan, and with a 90°/90° bend.
Mesh: 15M.

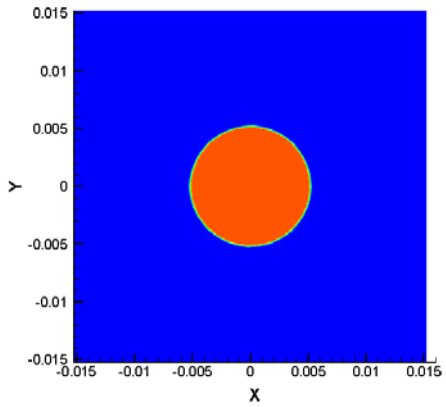
Axial velocity imposed at the jet inlet (a) x line plot (b) y line plot

Results of α_{Hg} at t = 0 s (initial)

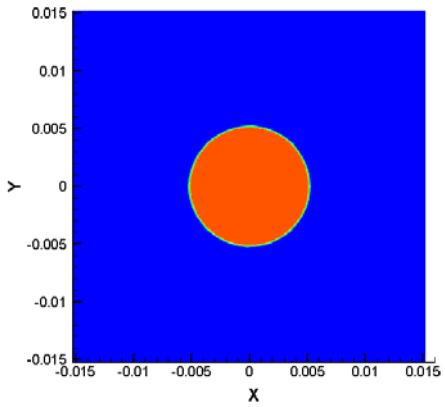
z= 0 cm



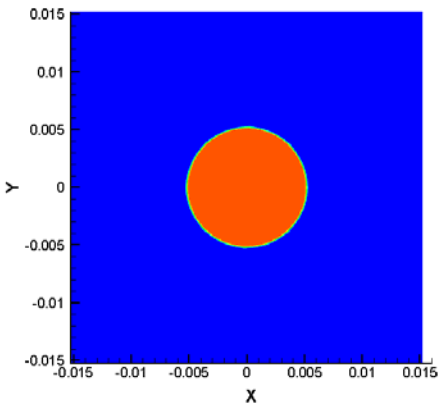
z = 1 cm



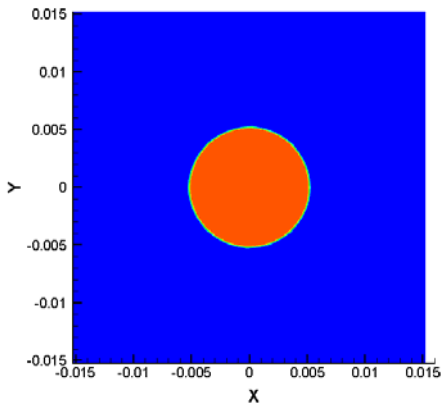
z = 5 cm



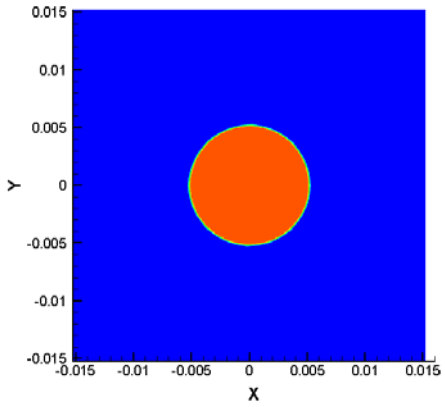
z = 10 cm



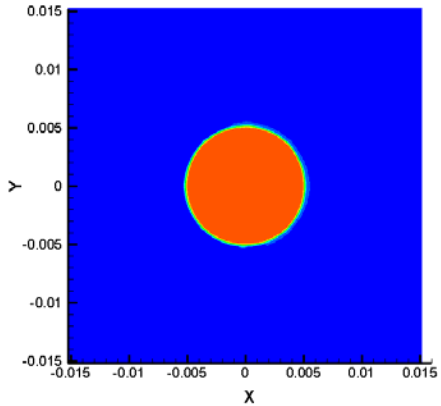
z = 15 cm



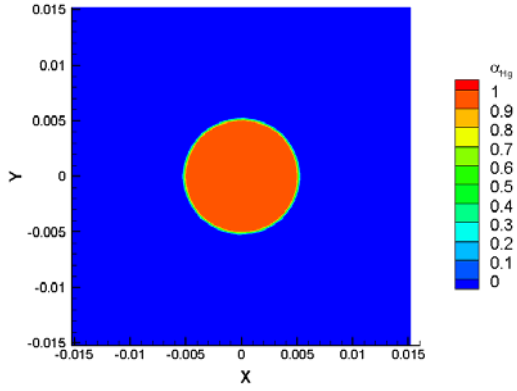
z = 20 cm



z = 30 cm



z = 45 cm

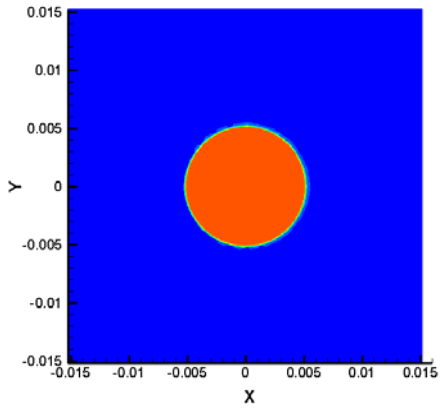


α_{Hg} = volume fraction of Hg.

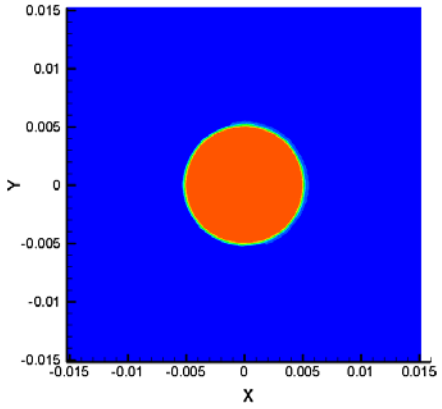
1 velocity flow thru time = 25 ms.

Results of α_{Hg} at t = 0.2 μs (one time step)

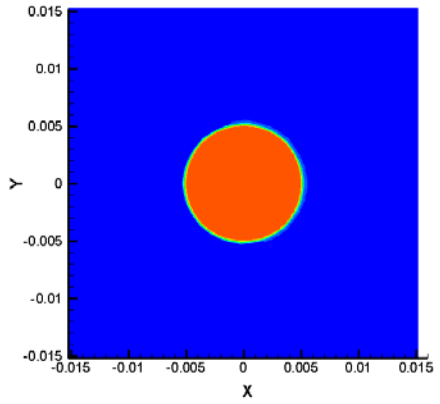
z= 0 cm



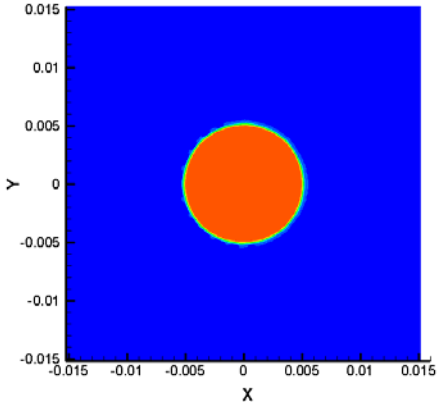
z = 1 cm



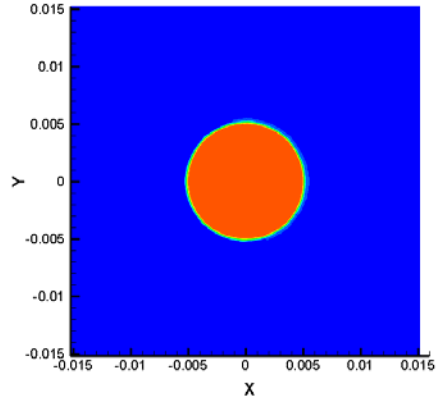
z = 5 cm



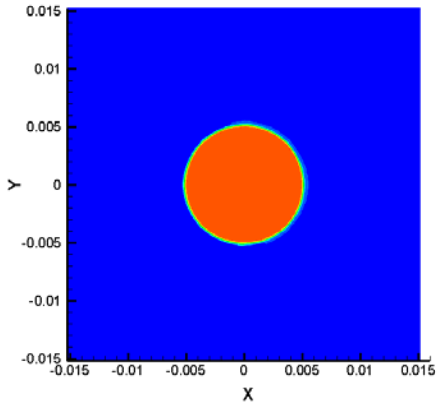
z = 10 cm



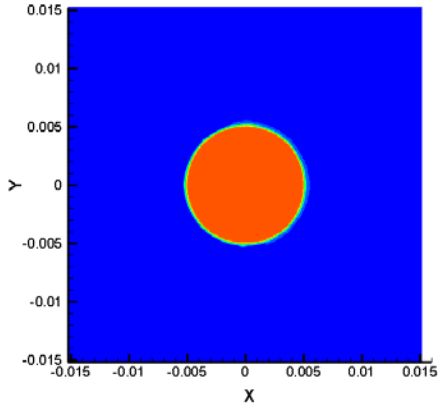
z = 15 cm



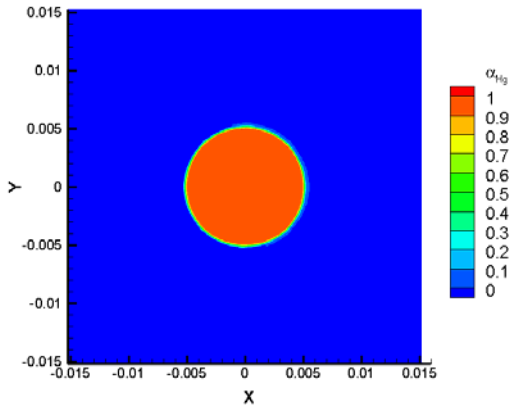
z = 20 cm



z = 30 cm



z = 45 cm

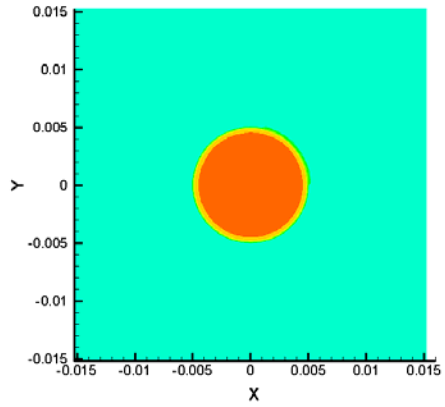


α_{Hg} = volume fraction of Hg.

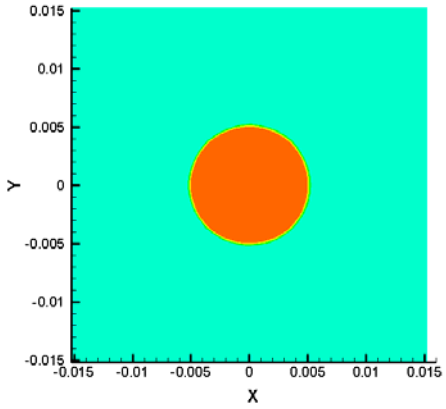
1 velocity flow thru time = 25 ms.

Results of u_z at t = 0.2 μs (one time step)

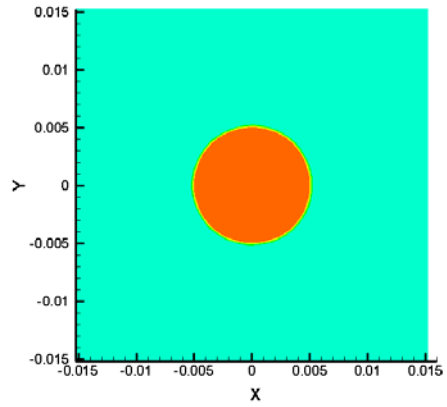
z= 0 cm



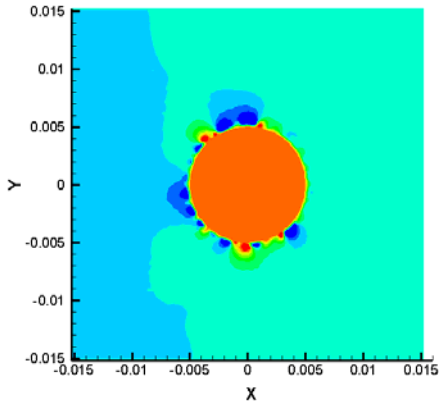
z = 1 cm



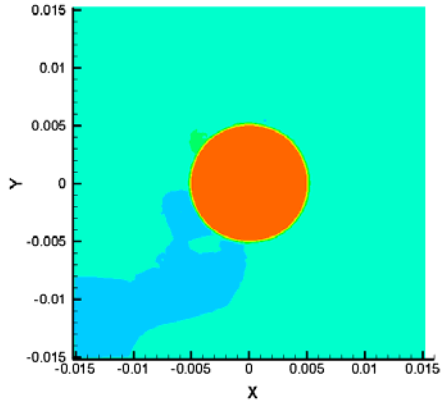
z = 5 cm



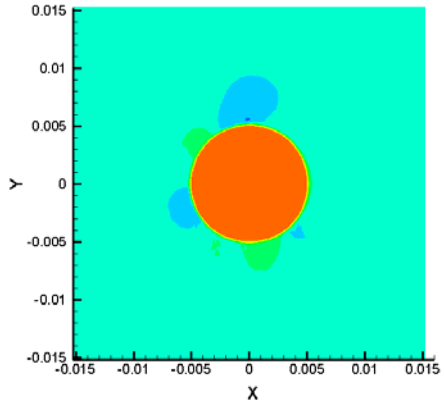
z = 10 cm



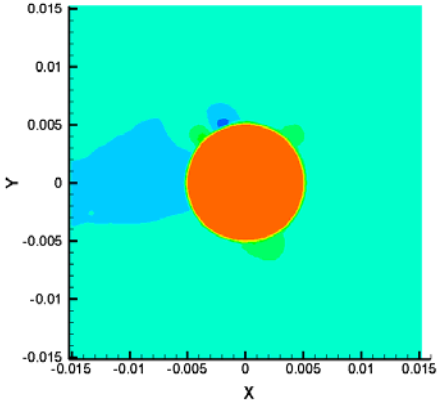
z = 15 cm



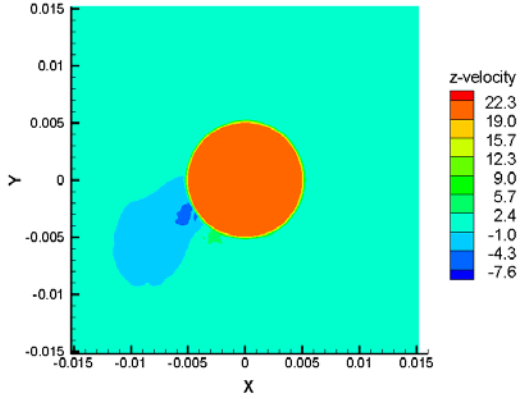
z = 20 cm



z = 30 cm



z = 45 cm

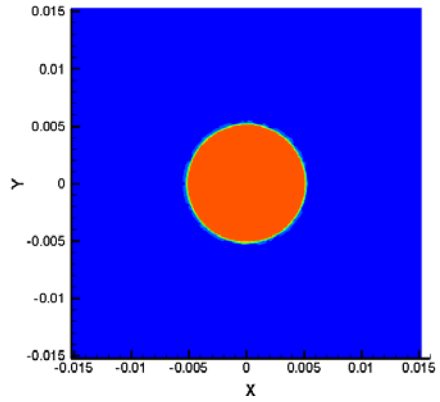


u_z = z-component of velocity.

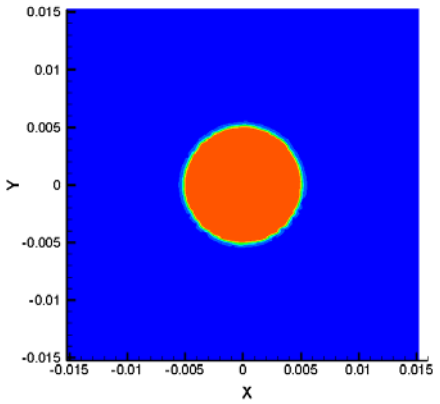
1 velocity flow thru time = 25 ms.

Results of α_{Hg} at t = 12 ms

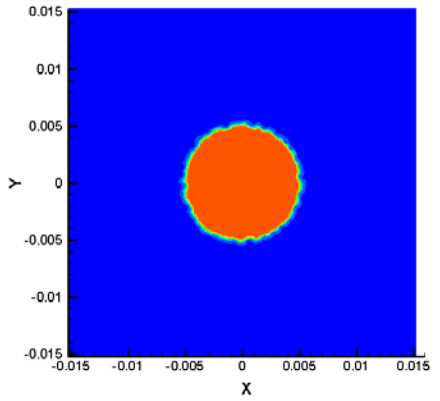
z= 0 cm



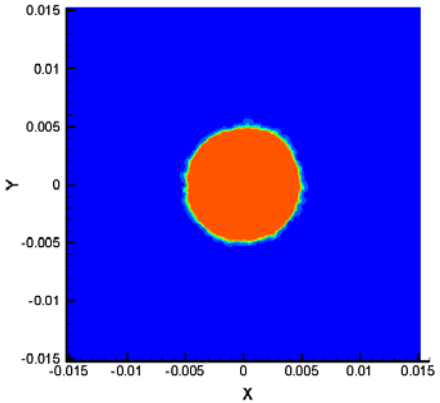
z = 1 cm



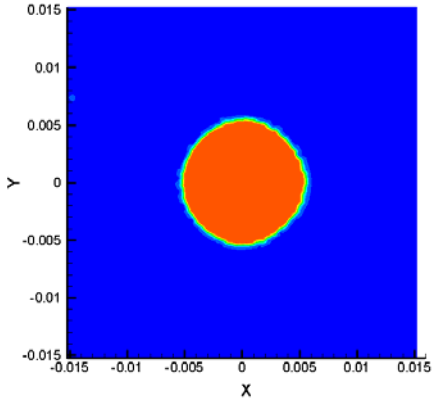
z = 5 cm



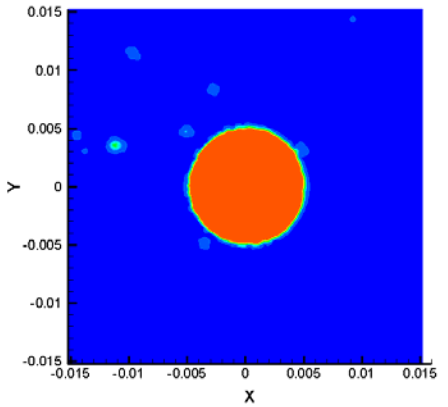
z = 10 cm



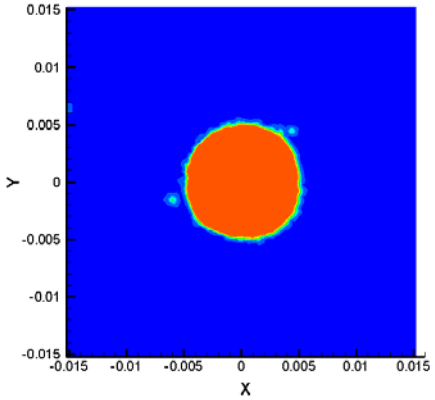
z = 15 cm



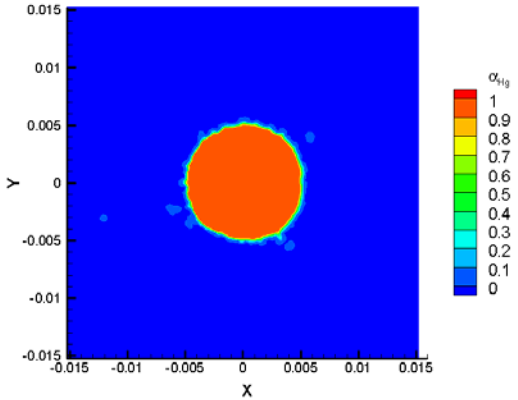
z = 20 cm



z = 30 cm



z = 45 cm

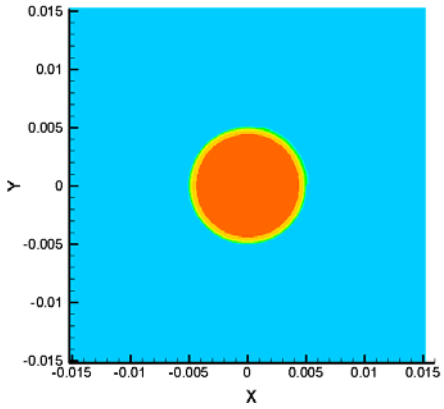


α_{Hg} = volume fraction of Hg.

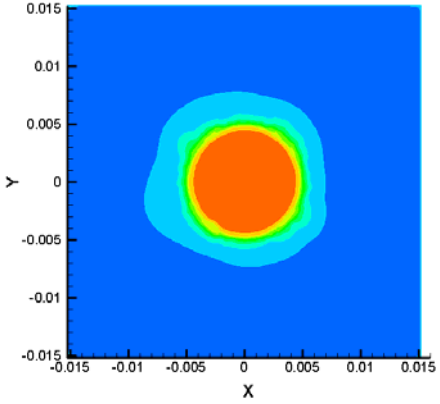
1 velocity flow thru time = 25 ms.

Results of u_z at t = 12 ms

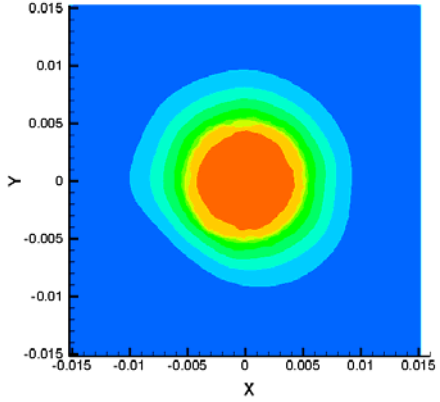
z= 0 cm



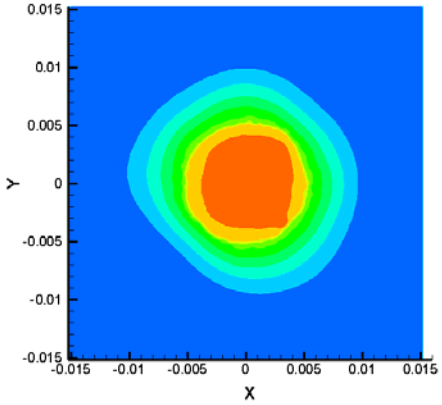
z = 1 cm



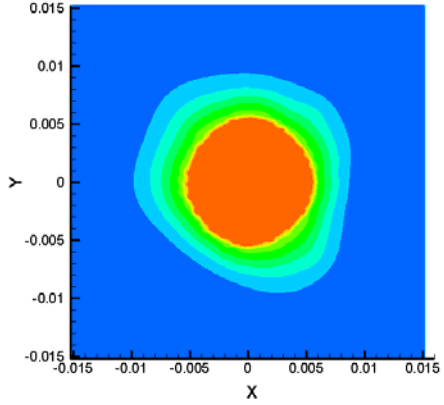
z = 5 cm



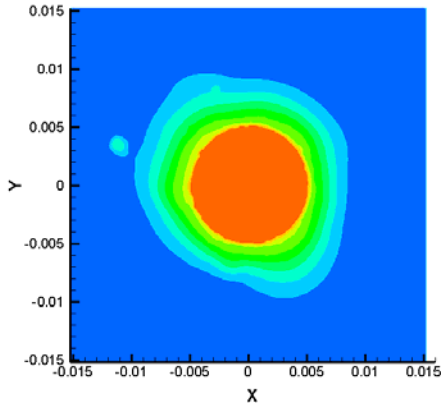
z = 10 cm



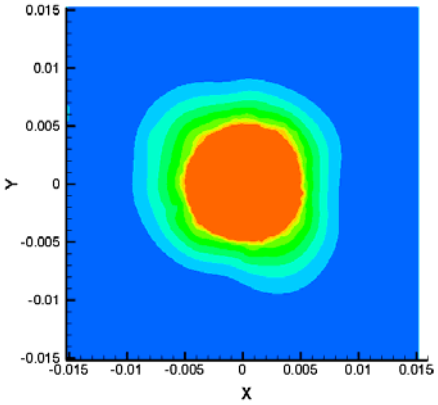
z = 15 cm



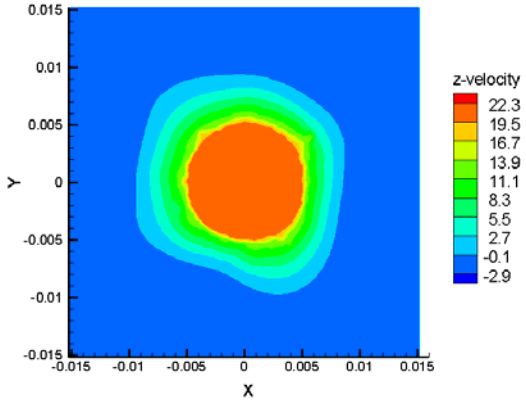
z = 20 cm



z = 30 cm



z = 45 cm



u_z = z-component of velocity.

1 velocity flow thru time = 25 ms.