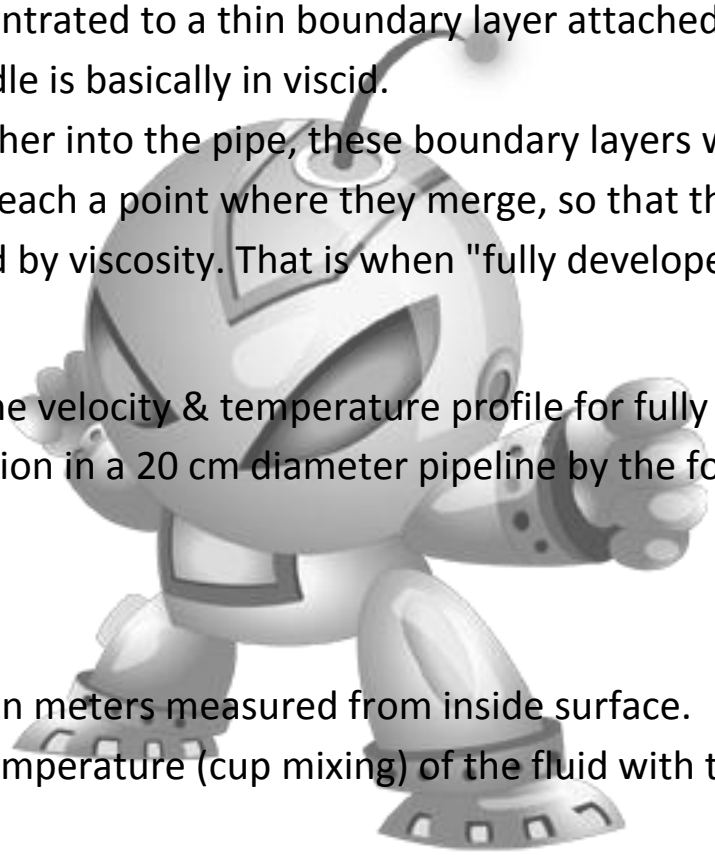
Avishkar 2011

Chemsoft

Problem Statement: 2

A jet of water entering a pipe.
Close to the entrance region (on the inside of the pipe), significant viscous effects will be concentrated to a thin boundary layer attached to the pipe wall. The fluid in the middle is basically in viscid.
As you progress further into the pipe, these boundary layers will increase in thickness until you reach a point where they merge, so that the whole fluid is significantly affected by viscosity. That is when "fully developed flow" has its onset.



Now approximate the velocity & temperature profile for fully developed flow at particular axial location in a 20 cm diameter pipeline by the following expression.
$u=96r-190r^2$ m/s.
$T=90.8(1-2r)\ ^{o}C$.
Where r is distance in meters measured from inside surface.
Calculate average temperature (cup mixing) of the fluid with the help of Microsoft excel.