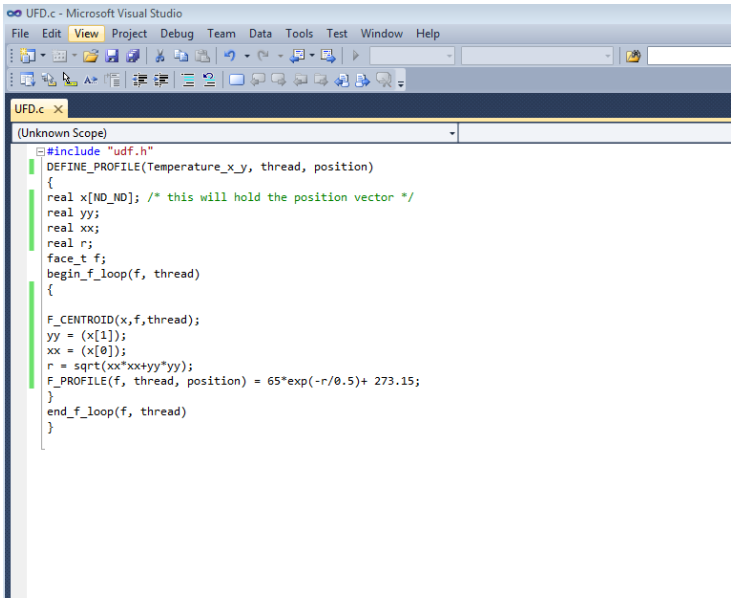
Eduardo Aguirre
MAE 598
10/13/2016

No collaboration

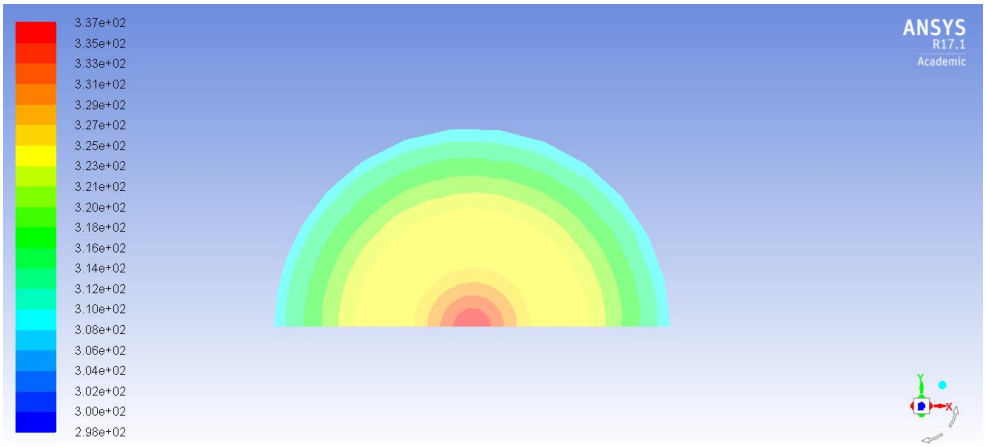
Challenge 1:

UDF code:

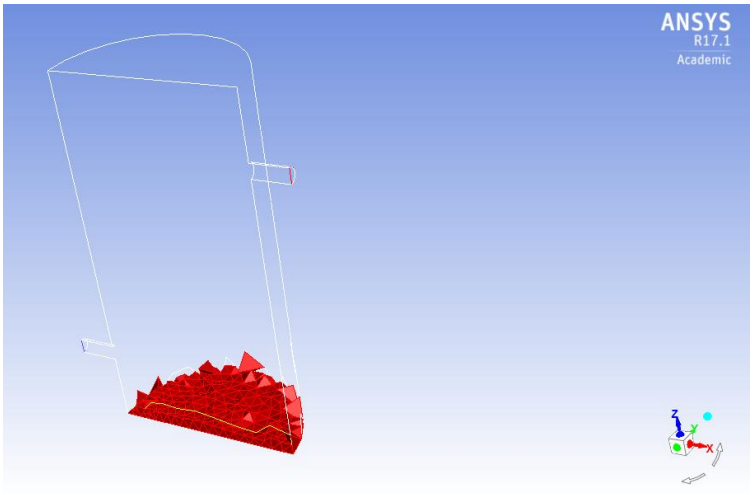
```
#include "udf.h"
DEFINE_PROFILE(Temperature_x_y, thread, position)
{
real x[ND_ND]; /* position vector */
real yy;
real xx;
real r;
face_t f;
begin_f_loop(f, thread)
{

F_CENTROID(x,f,thread);
yy = (x[1]);
xx = (x[0]);
r = sqrt(xx*xx+yy*yy);
F_PROFILE(f, thread, position) = 65*exp(-r/0.5)+ 273.15;
}
end_f_loop(f, thread)
}
```



Contour plot at the bottom of the tank:



Mesh Refinement:



1. Outlet Temperature

$$T_{out} = \frac{\int\int v_n T \, dA}{\int\int v_n \, dA}$$

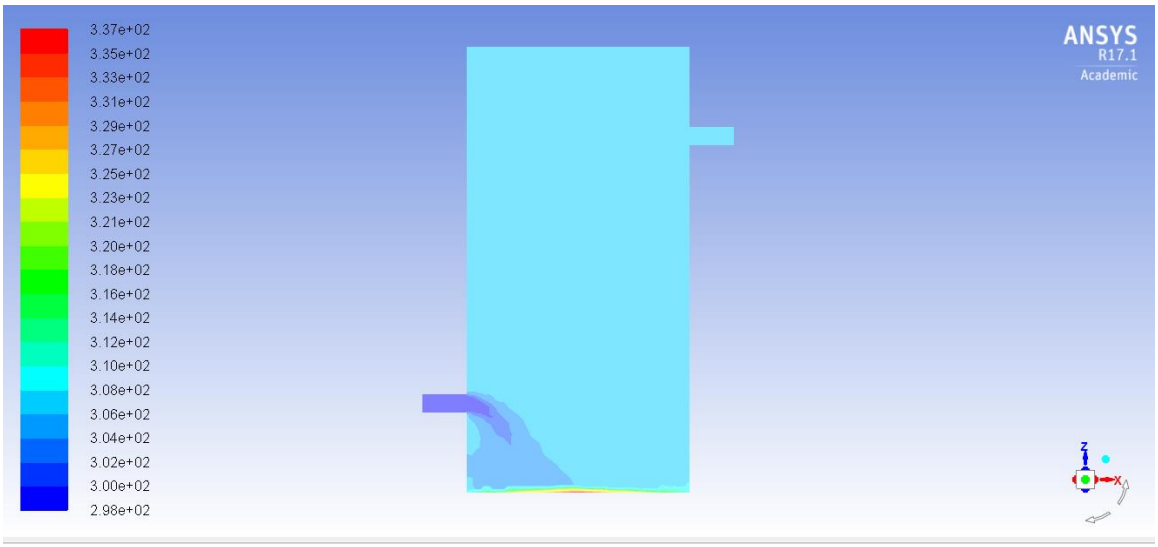
	Integral numerator
pressure_outlet	0.0094146682

	Integral X Velocity (m/s) (m2)
pressure_outlet	3.090456e-05

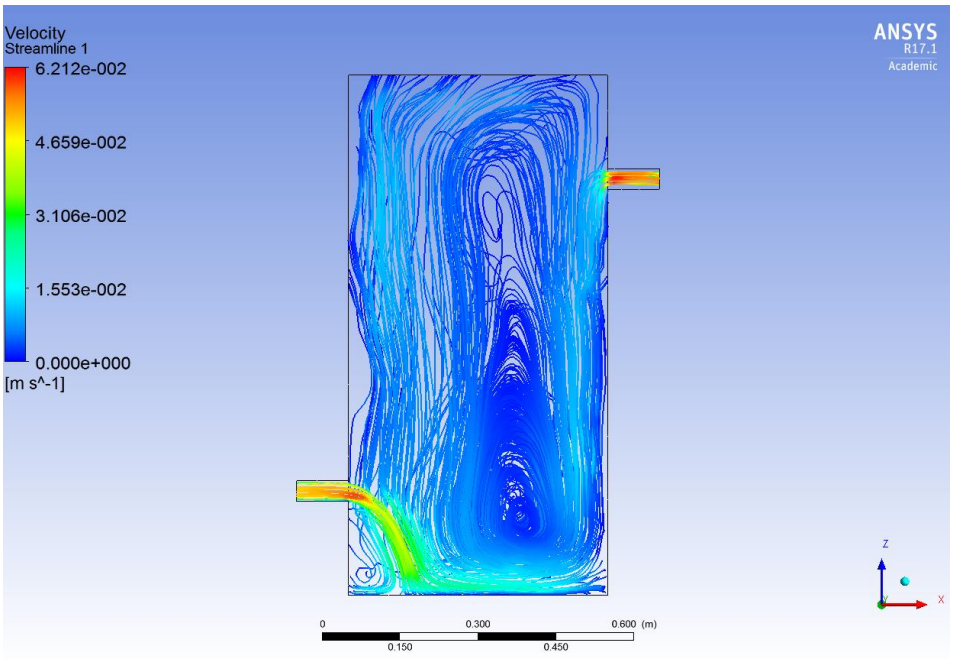
$$T_{out} = \frac{0.0094146682}{3.090456e-05} = 305.1967\ K$$

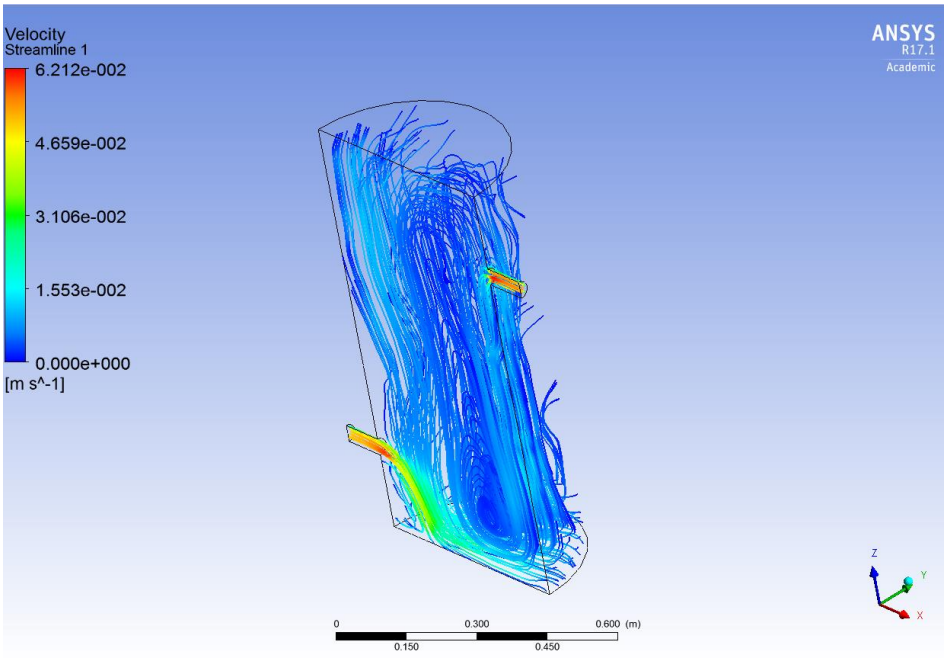
	Mass-Weighted Average Static Temperature (k)
pressure_outlet	305.1967

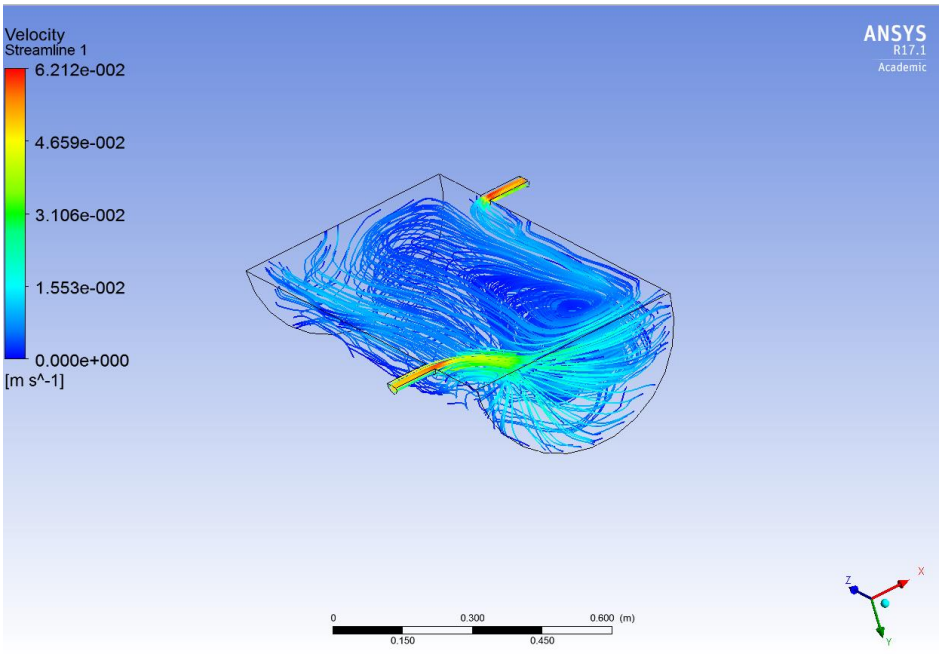
2. Contour plot



3. Streamlines




Velocity
Streamline 1
6.212e-002
4.659e-002
3.106e-002
1.553e-002
0.000e+000
[m s^-1]
ANSYS
R17.1
Academic
0
0.300
0.600 (m)
0.150
0.450
Z
Y
X


Velocity
Streamline 1
6.212e-002
4.659e-002
3.106e-002
1.553e-002
0.000e+000
[m s^-1]
ANSYS
R17.1
Academic
0
0.300
0.600 (m)
0.150
0.450
Z
X
Y

References:

http://www.public.asu.edu/~hhuang38/apache/acfd_c2_answer1.pdf

http://imechanica.org/files/fluent_13.0_lecture08-udf.pdf

http://www.engr.uconn.edu/~barbertj/CFD%20Training/Fluent/7%20User%20Defined%20Functions.pdf