Bsc Fluid Mechanics Lab Measurements

Lab M01 Assignments

A… Every task contains 3 parts . One of them shell be repeated to learn the repeatability of these types of measurements.

..G

A… Every task contains (3+1) x 1 measurements. If you do not want to struggle with 10 previously calculated accurate velocities, there is another possibility.

..G You can measure at about 30-40 velocities (instead of 10) just stepping up-and-up, not minding the velocities or Reynolds numbers. You gathering the data at fine velocity steps from the minimum velocity (determined by the noise threshold of the instrumentation)

to the maximum velocity (determined by the wind tunnel)

Every measuring point will take about half a minute.

The many points will give you a detailed drag coefficient function.

A Determine the drag coefficient of three cylinders of different diameter (having the same surface roughness) as a function of Reynolds number. Measure each cylinder at the same Reynolds number and repeat the measurement for 10 Reynolds numbers in total. In order to guarantee only 2D flow effects, utilize the circular endplates over the ends of the cylinders during the measurements.

B Determine the drag coefficient of 3 different cones of various heights as a function of Reynolds number. Measure each cone at the same Reynolds number and repeat the measurement for 10 Reynolds numbers in total.

C Determine the drag coefficient of 3 different cylinders having conical ends as a function of Reynolds number. Measure each cylinder of conical end at the same Reynolds number and repeat the measurement for 10 Reynolds numbers in total.

D Determine the drag coefficient of 3 spheres of different diameter as a function of Reynolds number. Measure each sphere of different diameters at the same Reynolds number and repeat the measurement for 8 Reynolds numbers in total.

E Determine the drag coefficient of 3 cones of varying height at 10 different velocities! Choose the velocities in the range of $30\%\cdot v_{max}$ and $100\%\cdot v_{max}$.

F Determine the drag coefficient of 3 vertical cylinders of different diameter at 10 different velocities. Choose the velocities in the range of $30\%\cdot v_{max}$ and $100\%\cdot v_{max}$.

G Determine the drag coefficient of 3 horizontal cylinders of different surface roughness (of the same diameter) at 10 different velocities. In order to guarantee only 2D flow effects, utilize the circular endplates over the ends of the cylinders during the measurements. Choose the velocities in the range of $30\%\cdot v_{max}$ and $100\%\cdot v_{max}$.

H Determine the drag coefficient of 3 cylinders of different heights as a function of Reynolds number. Measure the cylinders of various heights at the same Reynolds number and repeat the measurements for 10 Reynolds numbers in total.

I Measure drag coefficient on three bodies printed of red plastic.
1) sphere 2) 3/4 cup 3) 1/2 cup
(with the asymmetric bodies in both possible blowing direction)
Velocities: form vmax/30 to vmax in 30+ points.

J Measure drag coefficient on 5 bodies printed of red plastic.
1) flat disc 2) disc with sharp nose 3) cone 4) half sphere 5) rounded edge cylider
Velocities: form vmax/30 to vmax in 30+ points.