Using a Pitot-Static Probes to Measure Velocity

A pitot-static probe is a simple device used for measuring flow-velocity at a point.

A pitot probe measures stagnation pressure (the pressure produced by bring the flow to a halt). It consists of a tube connected at one end to a pressure sensing device (such as a manometer or pressure transducer) and open at the other. Stagnation pressure is measured by pointing the open end of the tube towards the oncoming flow.

A static probe measures static pressure (the actual pressure in the flow). It consists of an opening (or 'pressure tap') parallel to the local flow direction. The pressure tap may be located in a tube, or in the surface of a model.

A pitot-static probe is a combination of a pitot tube and static tube.

The speed of the airflow can be found by applying Bernoulli’s equation along a streamline:

\[ V = \sqrt{\frac{2}{\rho} \left( P_o - P \right)} \]

V is the velocity of the flow, \( P_o \) is the stagnation pressure, \( P \) is the static pressure and \( \rho \) is the fluid density. Note: You will need the conversion 1”\( \text{H}_2\text{O} = 248.8 \) Pa.