

# NASA TECH BRIEF



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## Water Velocity Meter

A water current meter with a 0 to 6 ft/sec range has been developed for steady-state flow measurements. Two mutually perpendicular components of the drag force exerted on a perforated sphere (see fig.) are measured via strain-gage techniques similar to those applied in wind tunnel instrumentation. This force is then related to the flow velocity about the sphere as follows:

$$F = \sqrt{F_x^2 + F_y^2} \quad \text{where } F = \text{drag force}$$

$$\theta = \tan^{-1} \frac{F_x}{F_y} \quad \theta = \text{flow direction}$$

$$V = \frac{\sqrt{2F}}{\rho A C_D} \quad \rho = \text{fluid density}$$

$$\quad \quad \quad \quad A = \text{frontal area of drag sphere}$$

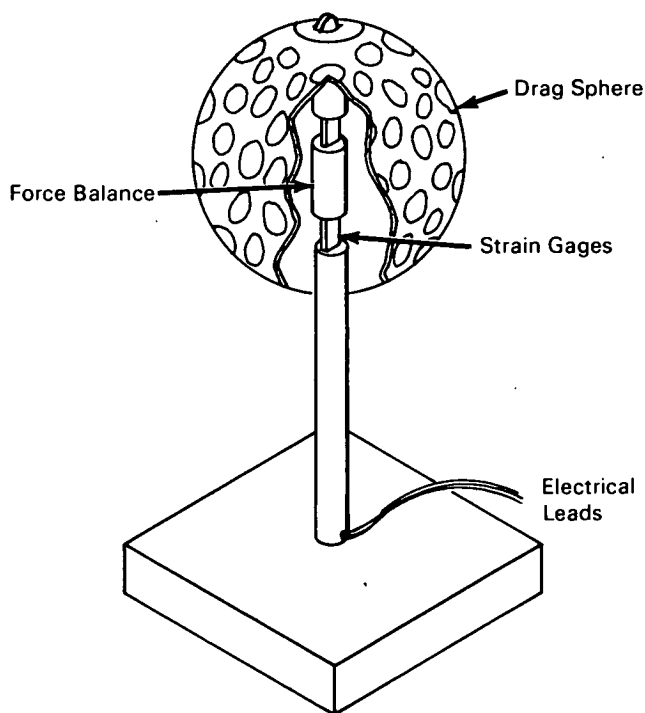
$$\quad \quad \quad \quad C_D = \text{drag coefficient}$$

The velocity range of from 0 to 6 ft/sec corresponds to a force range on the order from 0 to 1.7 lb.

These drag sphere velocity meters are simple and relatively inexpensive; and, when combined with an appropriate data acquisition system, they are well suited to applications where a large number of simultaneous measurements are needed for current mapping or velocity profile determination.

**Note:**

Additional documentation may be obtained from:  
 Technology Utilization Officer  
 Langley Research Center  
 Hampton, Virginia 23365  
 Reference: TSP70-10662



**Patent status:**

No patent action is contemplated by NASA.  
 Source: D. L. Smith and C. W. Roberts  
 Instrument Research Division  
 Langley Research Center  
 (LAR-10619)

Category 02