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:

\[ F = \sqrt{F_x^2 + F_y^2} \]

where 
- \( F \) = drag force
- \( \theta \) = flow direction
- \( \rho \) = fluid density
- \( A \) = frontal area of drag sphere
- \( C_D \) = drag coefficient

\[ \theta = \tan^{-1} \frac{F_x}{F_y} \]

\[ V = \frac{\sqrt{2F}}{\rho AC_D} \]

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
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Patent status:
No patent action is contemplated by NASA.

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