Abstract

DUAL USE OF A SEDIMENT MIXING TANK FOR CALIBRATING ACOUSTIC BACKSCATTER AND DIRECT DOPPLER MEASUREMENT OF SETTLING VELOCITY

While the Acoustic Doppler Velocimeter (ADV) is designed to determine fluid velocity, it is important to recognize that it is actually the velocity of the scatterers themselves that is measured. Thus in a calibration tank designed to relate sediment-induced backscatter to sediment concentration, the vertical velocity registered by an ADV at a given point is actually the true fluid velocity plus the sediment’s settling velocity. And absent net vertical volume flux, the average vertical velocity registered by an ADV across a horizontal plane is equal to the mean sediment settling velocity. For this study, a series of ADV calibrations were run in a 118 liter re-circulating tank for six sand sizes between 63 and 150 microns. A grid of ADV measurements distributed in a horizontal plane across the tank revealed that the mean vertical velocity registered by the ADV in each case was indeed consistent with each grain size’s settling velocity as independently measured by a “rapid sand analyzer” settling tube. In addition, a systematic increase in backscatter intensity for a given sand concentration was observed with increasing grain size.

Abstract URL

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