DEVELOPMENT OF NEW ADCP POST-PROCESSING AND VISULIZATION CAPABILITIES

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Acoustic Doppler Current Profilers (ADCPs) provide efficient and reliable flow measurements compared to other existing instruments for riverine environments. ADCPs rapidly collect voluminous amount of detailed flow 3-D velocities, river bathymetry and discharges using a moving or stationary measurement approach. In addition to originally targeted discharge measurements, ADCPs are increasingly utilized to determine other important river flow parameters such as turbulence characteristics, bed shear stress, bedload, suspended sediment, velocity gradients, and mean flow field. For post-processing of the acquired ADCP data, RD Instrument (2003), one of major manufacturer of ADCPs, provides customized software such as WinRiver and WinADCP for extracting data, visualization of various flow features, and exporting data in particular formats. Additional post-processing capabilities, most of them stemming from the use of the ADCP in coastal areas, are also available in conventional ADCP software but they are not conveniently adapted to measurements in streams.

Given that the raw ADCP data can be potentially used for deriving several velocity-based quantities, the need for the development of additional ADCP post-processing capabilities has emerged. The paper describes post-processing and visualization capabilities of a new software developed at IIHR-Hydroscience & Engineering using as input conventional ASCII and binary files output obtained with RDI's ADCPs. The software operates a database that stores raw and processed data and is fitted with graphical user interfaces to accommodate users with various degree of preparedness. Borland C++ (v. 6) was used for developing the interfaces and Microsoft Access for handling the database. The software is designed for research purpose and it is still under development. The paper describes the capabilities of the new software and its complementary role with respect to the commercially available software using measurements collected from moving and stationary ADCP deployments. Table 1 summarizes the new IIHR post-processing and visualization capabilities.

The IIHR development team is currently exploring the use of ADCP measurements for estimation of the roughness coefficient (Manning's n), visualization of 3-dimensional flow structures, conduct of measurement uncertainty analysis, and coupling the ADCP geo-referenced measurements with in GIS-based databases.

Table 1. Capabilities of the IIHR software

Measurement approach	**IIHR software capabilities**
Moving vessel ADCP measurements	General transect information • Determination of the main flow direction • Distance-based and ensemble-based cross sectional bathymetry profile • Estimation of the unmeasured edge bathymetry • Databases for raw and processed information • Stream Characteristics (Froude #, aspect ratio, hydraulic radius, bulk velocity) • Discharge calculations
	Velocity information from transect measurements • Streamwise/spanwise vertical velocity profiles • Vertical velocity profiles using logarithmic, power, wake laws • Streamwise horizontal velocity profiles • Depth-averaged velocity profiles • Double spatial averaged streamwise velocity profiles
Fixed vessel ADCP measurements	• Time series of streamwise velocities • Time-averaged mean velocities • Calculation of autocorrelation and power spectrum • Analysis of the mean velocity profile quality • Distribution of turbulent intensities • Distribution of Reynolds stress

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