

TURBULENCE AND FREE SURFACE INTERACTION

Sandro Longo

Department of Civil Engineering, University of Parma, 181/A Viale G.P. Usberti, 43100 Parma, Italy,
phone: +39 0521 905157; fax: +39 0521 905924; e-mail: sandro.longo@unipr.it

ABSTRACT

Instantaneous fluid level and the three-components fluid velocity were measured in a stationary flow field generated by a Crump weir in a laboratory flume, using an ultrasonic distance sensor and a three probe arrangement of an Acoustic Doppler Velocity Profilers (ADV), with increasing Froude number and free surface of the fluid ranging from flat to almost aerated. The data were elaborated obtaining the macro-turbulence Reynolds tensor in a reference moving with the fluid level. Also the space auto-correlation of fluid velocity and the correlations between free surface elevation and flow velocities were computed, adopting conditional averages based on free surface fluctuation statistics. The results guarantee an insight of the turbulence interaction with the interface.

Keywords: free-surface turbulence, ultrasonic measurements.