

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

A rapid filtering and reconstruction method of two-dimensional image velocimetry signals using a non-iterative POD-method JONATHAN HIGHAM, WERNHER BREVIS, CHRISTOPHER KEYLOCK, Univ of Sheffield — A method is presented, based on Proper Orthogonal Decomposition (POD), for the detection and estimation of outliers in two-dimensional signals. In experimental fluid mechanics, for a number of reasons, two dimensional data obtained using techniques such as Particle Image Velocimetry often contain outliers. The proposed methodology is based on the assumption that statistically significant outliers can be identified as abnormalities in the evolution of the temporal POD coefficients and as changes to the eigenvalues. Unlike previous methods, the estimation technique in the current method is non-iterative. It is instead dependent on a correction of a parameter introduced to search for abnormal, outlier induced magnitudes in the modal decomposition. The method is benchmarked by synthetically simulating outliers applied to two data sets: One data set is obtained experimentally using Particle Image Velocimetry; the other is based on a numerical simulation. The results demonstrate that the proposed approach is able to identify the outliers reliably and correct them with acceptable accuracy.

Jonathan Higham
Univ of Sheffield

Date submitted: 31 Jul 2015

Electronic form version 1.4