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Enhancement of Conditionally Sampled Signals for Coherent Structure Identification STAVROS TAVOULARIS, University of Ottawa, M. SADOK GUELLOUZ, Ecole Nationale d'Ingenieurs de Monastir, Tunisia — A new iterative method for enhancing phase-averaged statistics of conditionally sampled signals was developed. The first estimate of the time-dependent phase average is correlated with the signal of each detected event, following which the time axis of each event is shifted and adjusted in scale to produce a waveform that best matches that of the ensemble average. This also provides an opportunity to reject events whose maximum cross-correlation coefficient with the average is lower than a certain value. A new phase average of the modified events is then computed and the process is repeated until convergence has been achieved. This approach has been applied to three-dimensional velocity measurements in axial flow in a rectangular channel containing a cylindrical rod, in which large-scale, quasi-periodic, vortical coherent structures are known to appear. The phase average of the local velocity converged to essentially the same shape following a single iteration. The enhancement method yielded better defined ensemble averages and revealed details of the coherent structures that would otherwise be missed by the conditional sampling technique. When applied to the Variable Interval Time Average (VITA) conditional sampling technique, the present approach removes the dependence of the results on the threshold value, thus eliminating the subjectivity of the VITA technique. *Supported by the Natural Sciences and Engineering Research Council of Canada.

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