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**On constructing thermodynamic state variables for a dusty plasma from 3-D velocity measurements<sup>1</sup>** EDWARD THOMAS, JEREMIAH WILLIAMS, Auburn University — Over the past two decades, dusty plasmas have become a widely studied system because they offer the opportunity to study many plasma phenomena at the kinetic (particle) scale. In particular, laboratory experiments on dusty plasmas can be constructed to exist in a variety of configurations from a highly ordered crystal-like state to a disordered gas-like state. Through the use of stereoscopic particle image velocimetry (stereo-PIV) techniques, it is now possible to examine the velocity space distributions and its moments to obtain information on the thermodynamic properties of dusty plasmas. This presentation reports on the application of this velocity space analysis method to construct state variables for a dusty plasma specifically, pressure, temperature, and a new quantity, flow. In this study, several physical systems that have been measured using PIV techniques are reanalyzed using this approach. In particular, stereo-PIV measurements of particle cloud formation, streams, and dust acoustic waves will be considered.

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