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Remote flow sensing of complex systems: steps towards spatio-temporal prediction of flow patterns[1] BRUNO MONNIER, PARITOSH MOKHASI, DIETMAR REMPFER, CANDACE WARK, Illinois Institute of Technology — Prediction of the spatial and temporal phenomena of wind flow patterns through urban areas is investigated. Typically sparse measurements are used in wind forecasting models for updating and prediction via a method called variational data assimilation. To improve upon this method, an experimental investigation combining various measurement tools (Hot Wire Anemometry, Stereoscopic Particle Image Velocimetry SPIV), static pressure measurements and Laser Doppler Velocimetry(LDV)) is carried out to study the airflow around wall mounted obstacles in a turbulent boundary layer. The method of Proper Orthogonal Decomposition (POD) is used to decompose the flow field into a finite set of POD coefficients which vary only in time associated with a corresponding set of POD basis functions which vary only in space. Direct measurement models utilizing the measurements from SPIV and LDV, along with indirect measurement models using sparse measurements from microphones are investigated and may ultimately be combined with state-space models to obtain more robust dynamical models.

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