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Tip vortex core pressure estimates derived from velocity field measurements KYLE SINDING, MICHAEL KRANE, Penn State University — We present estimates of tip vortex core pressure derived from velocity field measurements of a high Reynolds number flow over a lifting surface. Tip vortex cavitation decreases propulsor efficiency and contributes to both unwanted noise and surface damage. Coordinated load cell, pressure, and velocity measurements were performed in the 12-inch tunnel at the Applied Research Laboratory at Penn State University, over a range of angles of attack and flow speeds. Stereo PIV imaging planes were oriented normal to the tunnel axis. Pressure estimates in each measurement plane were estimated from the velocity field. Visual cavitation calls were performed over the same range of conditions as the optical velocity measurements, by varying the tunnel pressure until tip vortex cavitation was observed to initiate. The pressure differences between the tip vortex and the tunnel ambient pressure obtained with these two methods were then compared.

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