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Reynolds Number Effects on Helicopter Rotor Hub Flow DAVID REICH, STEVE WILLITS, SVEN SCHMITZ, The Pennsylvania State University — The 12 inch diameter water tunnel at the Pennsylvania State University Applied Research Laboratory was used with the objective of quantifying effects of Reynolds number scaling on drag and shed wake of model helicopter rotor hub flows. Hub diameter-based Reynolds numbers ranged from 1.06 million to 2.62 million. Measurements included steady and unsteady hub drag, as well as Particle Image Velocimetry. Results include time-averaged, phase-averaged, and spectral analysis of the drag and wake flow-field. A strong dependence of steady and unsteady drag on Reynolds number was noted, alluding to the importance of adequate Reynolds scaling for model helicopter rotor hubs that exhibit interaction between various bluff bodies.

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