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Multirotor Unmanned Aerial Vehicle (UAV) Flight Performances under Shear Flow Turbulence with Different Control Schemes NINGSHAN WANG, JEAN-ERIC VAN DER ELST, AMIT SANYAL, MARK GLAUSER, Syracuse University, SKYTOP TURBULENCE LAB TEAM — In this research, several multi-rotor UAV test flights under shear flow turbulence are carried out. The flight performance of the multi-rotor UAV is evaluated when exposed to such turbulence. The UAV implemented with linear control scheme and nonlinear geometric control scheme are tested with different shear rates and freestream velocities to obtain their performances under a variety of conditions. Characterization of the shear flow field is evaluated by an array of total pressure scanners to measure the shear rate and free stream velocity spatially. Besides, the generated shear flow is simulated by Computational Fluid Dynamics (CFD) tools to compare with the fluid flow data obtained from the pressure scanners. The flight performance data is obtained through the Inertial Measurement Unit (IMU) integrated inside the autopilot hardware of the UAV.

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