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Flow Visualization to Complement Modern Wing Tunnel Testing

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Flow Visualization to Complement Modern Wind Tunnel Testing

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In recent times, wind tunnel testing at the NASA Ames Unitary Plan Wind Tunnel (UPWT) seeks to validate computational fluid dynamics (CFD) tools. To that end, we find that now more than ever, flow visualization is a powerful capability that provides context to the experimental results bringing real-time insight to the researcher. It enables us to answer questions like: "Why does this drag polar look different?" or "What is the source of this tone in the microphone data?". Flow visualization can verify that assumptions made in the CFD model are correct, addressing questions like: "Are our trip dots the correct size and location?" or "Does the position of this shock match our prediction?". Techniques such as infrared flow visualization and schlieren / shadowgraph are powerful capabilities that when taken together can provide results as to the nature of the fluid structure interaction at a test condition in a format that pairs well with computational results. When properly integrated these measurements can be taken with no impact on the productivity of the test program, supplementing traditional measurements and often discovering something unforeseen, helping the researcher to answer those slippery aerodynamic questions and ultimately build confidence in the accuracy of a model.



Infrared Flow Visualization: NASA Ames Check Standard Model