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Flight experiments on laminar flow control in swept-wing boundary layers[1] WILLIAM SARIC, HELEN REED, ANDREW CARPENTER, CELINE KLUZEK, LAUREN HUNT, SHANE SCHOUTEN, Texas A&M University
— Data are presented on boundary-layer transition to turbulence in low-disturbance environments. It uses a combination of hotfilm anemometry and infra-red thermography to study a variety of roughness related issues in flight. The hotfilm measurements give the important passband and spanwise scales while the thermography gives transition location. A swept-wing model is mounted on the wing of a Cessna O-2 aircraft. An Euler code is used calculate the aircraft flowfield while parabolized stability equations correlate the stability measurements and transition locations. The laminarization scheme of spanwise-periodic distributed roughness elements is investigated at chord Reynolds numbers of 7.5 million. In the past year, a number of flight tests have been conducted. Measurements were made to determine the pressure distribution on the model and the transition locations for clean configurations, and transition locations for enhanced surface roughness that simulates an operational surface finish. For clean configurations, natural laminar flow was achieved over 80% of the surface of a 30° swept-wing model at chord Reynolds numbers of 7.55 million. The corresponding amplification factors were at N = 14.

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