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Aero-acoustic performance of Fractal Spoilers J. NEDIC, B. GANAPATHISUBRAMANI, C. VASSILICOS, Imperial College London, J. BOREE, L. BRIZZI, A. SPOHN, Institute Pprime, CNRS-ENSMA-Universite de Poitiers —
One of the major environmental problems facing the aviation industry is that of aircraft noise. The work presented in this paper, done as part of the OPENAIR Project, looks at reducing spoiler noise through means of large-scale fractal porosity. It is hypothesised that the highly turbulent flow generated by these grids, which have multi-length-scales, would remove the re-circulation region and with it, the low frequency noise it generates. In its place, a higher frequency noise is introduced which is susceptible to atmospheric attenuation, and would be deemed less offensive to the human ear. A total of nine laboratory scaled spoilers were looked at, seven of which had a fractal design, one conventionally porous and one solid for reference. All of the spoilers were mounted on a flat plate and inclined at 30° to the horizontal. Far-field, microphone array and PIV measurements were taken in an anechoic chamber to determine the acoustic performance and to study the flow coming through the spoilers. A significant reduction in sound pressure level is recorded and is found to be very sensitive to small changes in fractal grid parameters. Wake and drag force measurements indicated that the spoilers increase the drag whilst having minimal effect on the lift.

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