

Abstract Submitted
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A New Instance of Crackle Noise JOSEPH MATHEW, SUMIT PATEL, Indian Institute of Science — Intense crackle noise has been identified and studied in high temperature, supersonic jets of engines operating at high specific thrust. We observed a new instance of crackle in LES of cold, plane, perfectly expanded supersonic jets (Mach 1.5, Reynolds number 100,000) impinging on plane wedges. LES is by explicit filtering, with a new adaptive filtering method for shock capturing. Crackle fronts appear when a detached normal shock stands about half a jet-width from the wedge tip, and the jet column is about 4 jet-widths (nozzle to wedge tip). The edges of this oscillating shock interact with the jet's bounding shear layer structures to emit acoustic wave fronts that steepen as they travel into the far field. Pressure signals exhibit sudden rises followed by gentle relaxations, intermittently. Consistently, pressure distributions along lines in the ambient show the existence and arrival of a sequence of sharp compression fronts. Skewness exceeds 0.4 in the far field. Crackle fronts do not appear in other configurations such as a short column (steady shock), short column and thin wedge (steady, attached, oblique shock), and a long column, thin wedge (large amplitude column oscillations).

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