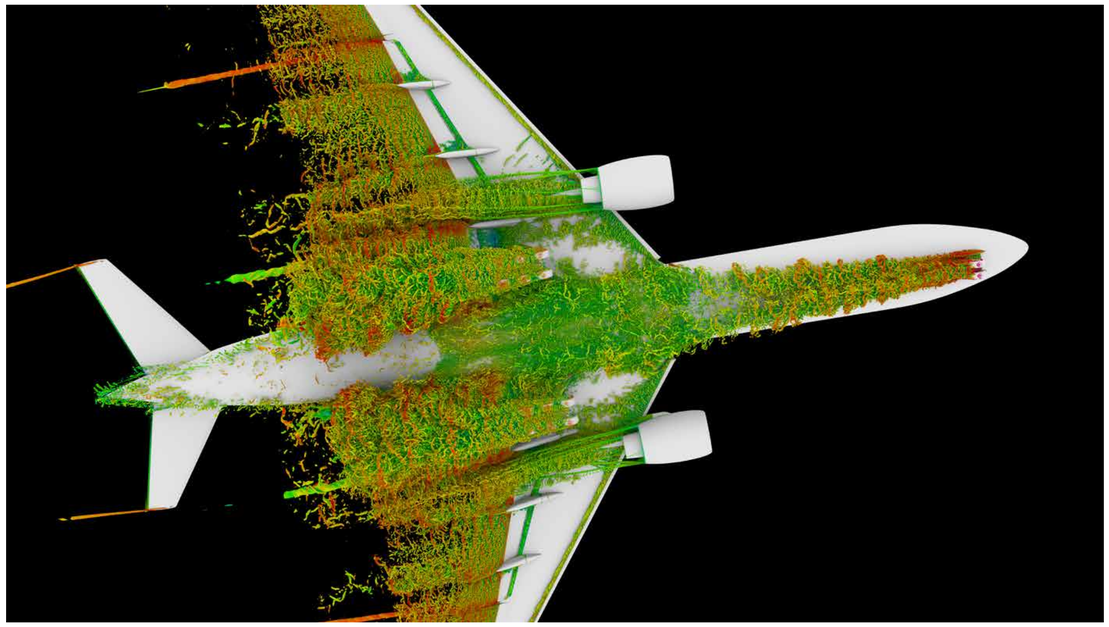
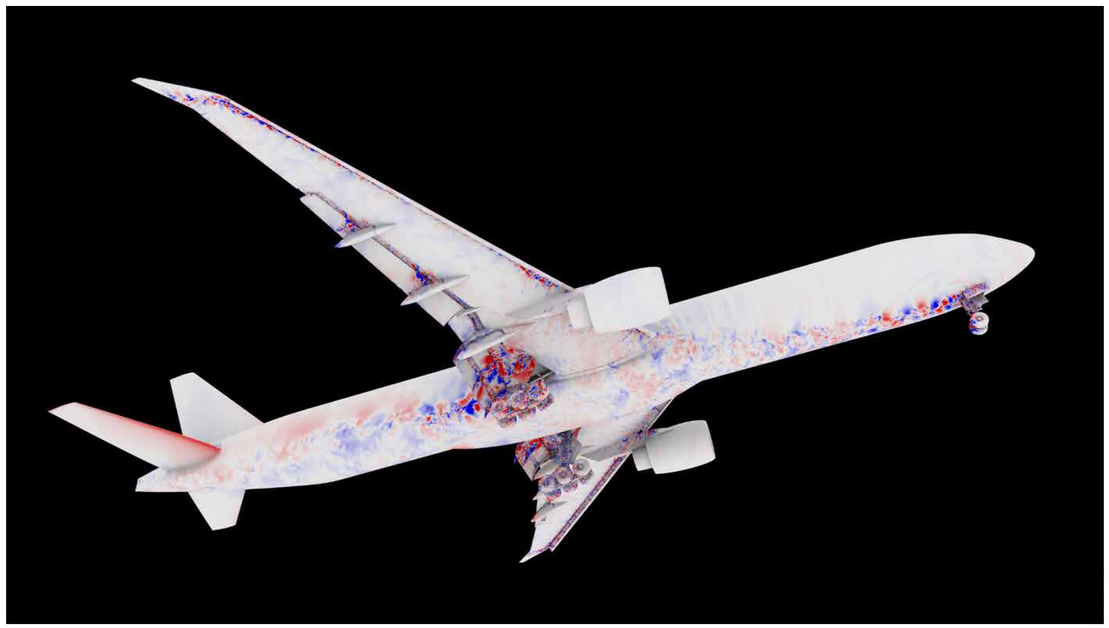
National Aeronautics and
Space Administration



Visualization of the simulated flow field around a large airliner. Note the complex, vortical, unsteady flow features generated by the wing high-lift devices (leading edge slats and trailing edge flaps) and aircraft landing gear. *Benedikt Koenig, Dassault Systemes; Patrick Moran, NASA/Ames*



The fluctuating surface pressure resulting from the flow field shown in the top image produces broadband sound that propagates to the ground. Red denotes positive pressure fluctuations and blue denotes negative pressure fluctuations.
Benedikt Koenig, Dassault Systemes; Patrick Moran, NASA/Ames

Airframe Noise Prediction Grand Challenge: Simulating a Large Airliner Landing

Physics-based prediction of airframe aeroacoustics is crucial to developing mitigation strategies to substantially reduce the noise pollution of civil aircraft during landing and takeoff. Accurate prediction of airframe noise for a full-scale, large airliner with high-lift devices and undercarriage deployed is a grand challenge for the aerospace community. The extreme geometrical complexity of a large civil transport during landing generates noise-producing flow features containing a broad range of spatio-temporal scales. We used the Lattice Boltzmann code PowerFLOW to investigate the unsteady flow field surrounding a Boeing 777. Our high-fidelity simulations help characterize the salient noise sources and guide the development of effective noise reduction technologies for use in current and future aircraft.

Mehdi R. Khorrami, NASA Langley Research Center

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