



STATISTICAL ENGINEERING TOWARD COMMERCIAL SUPERSONIC FLIGHT: NASA'S QUESST MISSION

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NASA's Quesst Mission has dual goals of demonstrating low-noise supersonic technology in flight and surveying public reactions to low-noise supersonic overflight. For half a century, commercial aircraft have been required to fly slower than the speed of sound over land to prevent “creating an unacceptable situation” on the ground due to sonic booms. However, aircraft shaping techniques honed through decades of research have dramatically changed the way shockwaves from supersonic flight merge together as they travel to the ground. What used to sound like a boom on the ground will be transformed into a thump. NASA is now building a full-scale, piloted demonstration aircraft called the X-59 to demonstrate low-noise supersonic flight. In 2024, the X-59 aircraft will commence a national series of community overflight surveys to collect data on how people perceive “sonic thumps.” The results will be provided to national and international noise regulators as they consider creating new standards that allow commercial supersonic flight over land at acceptably low noise levels.

In this presentation we provide historical context for the current prohibitions on supersonic commercial flight. Using data collected during earlier NASA tests, we demonstrate how generalized linear mixed models can be used to inform the functional dose-response curve. We also illustrate simulation experiments of the variability of sonic thump exposure across the United States. Finally, we discuss some of the challenges in designing the future community studies and generalizing them to a nationally-representative dose-response curve.

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