MIDWEST MECHANICS SEMINAR

Fluid mechanics of riblets drag reduction

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ARMS B071 3:30PM-4:20PM

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Abstract

Riblets are a surface texture composed of tiny ribs applied on aircraft skin to reduce drag, which saves on fuel, increases the payload and extends the range. To the fast-moving turbulent air that flows over it, riblets turn out to be smoother, generating less skin friction, than a perfectly flat surface. However, riblet performance is highly sensitive to their cross-sectional shape and features, which is bad news because the micron-sized ribs, imperceptible to the naked eye and challenging to measure even with precision instruments, are impossible to manufacture and maintain perfectly. Thus, accurate tolerancing, not only for manufacture but also for lifetime wear planning and monitoring, is key to this technology, requiring predictive capability of the kind that derives from advances in basic understanding. In this regard, I will present some of the progress we have made in the last few years, building on decades of research, on the fluid mechanics of turbulence over riblet surfaces.

Biography

Daniel is a professor in the Department of Mechanical Engineering at the University of Melbourne. He obtained his bachelor's degree in engineering and computer science from the University of Melbourne in 2003, and his PhD in aeronautics from Caltech in 2009. He was a postdoc at the Jet Propulsion Laboratory before joining the University of Melbourne in 2012. Daniel's research uses computational fluid dynamics, where he tries to distil turbulent flows into simplified problems and to build physics-based models for prediction. Recently, he has been interested in understanding and controlling turbulent flow and thermal convection over rough surfaces, riblets and moving wavy surfaces.

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