

DEPARTMENT OF MECHANICAL ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

An Efficient Wave-Packet Tracking Strategy for Hypersonic Transition Prediction

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Abstract: Hypersonic flight vehicles are among the most sophisticated devices ever envisioned. An important aspect during the design process of hypersonic flight vehicles is the accurate prediction of the state of the boundary-layer (i.e. laminar, transitional or turbulent), which strongly affects skin friction and heat transfer coefficients, as well as lift and moment coefficients and therefore the stability of the vehicle. For hypersonic atmospheric flight, a crucial design aspect is the prediction of heat transfer rates on the surface of the vehicle, which may vary dramatically depending on whether the state of the boundary-layer is laminar, transitional or turbulent. Hence, a reliable stability and transition analysis is paramount for reducing the uncertainty in the prediction of vehicle performance. Currently available hypersonic transition prediction tools are limited to simple canonical geometries (cones, plates, wedges, etc.) and moderate angles of attack. This seminar will present a novel method, namely: Adaptive Mesh Refinement Wave Packet Tracking (AMR-WPT) method, for hypersonic transition prediction. This method can be applied to complex geometries, is very efficient in terms of computational cost, and overcomes some of the drawbacks of current transition prediction tools. This presentation will introduce the numerical schemes and provide some validation cases relevant to hypersonic transition.

Bio: Oliver Browne is a Postdoctoral Research Associate in the Department of Mechanical Engineering at University of Kentucky. He was born and raised in Coulsdon, a town in London, England. He received his B.Eng. degree in Aerospace Engineering from Coventry University (UK) in 2011 and his M.Sc. in Aeronautics from Imperial College London (UK) in 2012. He received his Ph.D. (funded by a Marie Curie Fellowship from the European Union) in Aerospace Engineering from Universidad Politecnica de Madrid (Spain) in May 2016. From September 2016 until August 2017, Oliver was a Postdoctoral Research Associate at University of Arizona but based at University of Kentucky as a Visiting Scholar. In August 2017, he became a Postdoc at the University of Kentucky, working for Dr. Christoph Brehm and conducting research in the field of hypersonic transition.

Date: September 15, 2017
Place: CB 118

Time: 3:00 to 4:00p
Contact: Dr. Alexandre Martin 257-4462

Meet the speaker and have refreshments
Attendance open to all interested persons



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