Abstract Submitted
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Receptivity to thermal noise in real airfoil configurations[1] PAOLO LUCHINI, University of Salerno — Thermal noise, the macroscopic manifestation of microscopic particle agitation, is present in fluid flow just as in electron flow in conductors or in other physical transport phenomena. When the flow acts as an amplifier, typically during transition to turbulence, the transition position can be influenced by the amplitude of external disturbances through the so called receptivity of the flow instabilities; internally generated thermal noise represents a thermodynamically enforced lower bound to how much disturbances can be reduced. In a previous paper (Seventh IUTAM Symposium on Laminar-Turbulent Transition, IUTAM Bookseries Volume 18, Springer, 2010, pp 11-18), the present author showed that the maximum transition distance in a Blasius boundary layer corresponds to a Reynolds number little above $6 \cdot 10^6$ and to an N-factor of the order of 13. Results to be exhibited at this conference show that in a real airfoil configuration the maximum transition Reynolds number imposed by thermal noise is even lower than on a flat wall, and not far from the actually observed transition position. It follows that thermal noise might actually have a role in natural transition; and that even a perfectly silenced laboratory environment cannot push the transition position much farther.

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Paolo Luchini
University of Salerno

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