

Readers' Forum

Brief discussion of previous investigations in the aerospace sciences and technical comments on papers published in the AIAA Journal are presented in this special department. Entries must be restricted to a maximum of 1000 words, or the equivalent of one Journal page including formulas and figures. A discussion will be published as quickly as possible after receipt of the manuscript. Neither the AIAA nor its editors are responsible for the opinions expressed by the correspondents. Authors will be invited to reply promptly.

Comment on "Role of Transient Growth in Roughness-Induced Transition"

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COMMENTS offered to the authors¹ during the review process are summarized herein. In Ref. 2, it was shown that the original passive ablating nosetip (PANT) correlating approach could not reconcile available wind-tunnel and ballistics-range data sets for roughness-induced transition on blunt bodies at hypersonic speeds. The only correlating approach capable of accomplishing this task was shown to be the constant critical roughness Reynolds number concept. Successful applications of this transition model to the de-

sign of actual reentry systems have been achieved. In Ref. 3, Batt and Legner offered a reanalysis of the PANT correlating approach. As discussed in Ref. 4, invalid transformations were applied in Ref. 3 to in-plane surface roughness heights in an attempt to convert such measurements to three-dimensional, peak-to-valley heights. As a consequence, this revised PANT correlating approach is also invalid. The design correlation published in Ref. 3 had an uncertainty band on the dependent (transition onset) parameter of over 100%, making it of little utility to real-world applications. Agreement between the transient growth model and the revised PANT correlating approach validates neither. As concluded in the review paper of Ref. 4, the current state of the art strongly supports the concept of a critical roughness Reynolds number for roughness-induced transition in a wide ensemble of reentry applications.

References

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- ³Batt, R. G., and Legner, H. H., "A Review of Roughness-Induced Nosetip Transition," *AIAA Journal*, Vol. 21, No. 1, 1983, pp. 7–22.
- ⁴Reda, D. C., "Review and Synthesis of Roughness-Dominated Transition Correlations for Reentry Applications," *Journal of Spacecraft and Rockets*, Vol. 39, No. 2, 2002, pp. 161–167.

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