We see Notes which are basically correct but essentially routine extensions of existing work; more seriously, however, Notes, frequently sequential, covering various aspects of a problem, the whole of which should be covered in *one* paper. May we recommend to authors that they appraise the status of work in progress against the appropriate timing and scope of disclosure so that the several means of communication can continue to fulfill their function properly.

Since its inception two years ago, the Journal has gone through major changes in scope, philosophy, and format. During this period, the Editors have had the benefit of counsel and advice from their peers in the technical community and the AIAA. Communications from the authors of rejected manuscripts also have been to the point—albeit narrow in concept. The Editors would welcome comments from perhaps the most important section of the aerospace community—that dedicated to the future. Where are the wild and creative young (at least in spirit) men who are now working on the frontiers of aerospace technology, too busy perhaps (perish the thought) to attend Institute meetings and to write papers or letters to the Editor? What are the great technical issues of the day and the future as *they* see them? The Editors and the Institute would most earnestly welcome not only manuscripts but other communications from this group and will give them most careful consideration.

Finally, may we again share with the authors the intellectual stimulation and pleasure we derive from our role in contributing to the exposure of their creative ideas.

Leo Steg
Editor-in-Chie

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The difference in ψ for tests conducted in nitrogen and air, resulting from the influence of chemical reactions on the molecular weight of injection products and subsequent effects on the mass transfer factor β, is shown in Fig. 3 of the preceding comments. Careful inspection of this figure reveals that, at a value of normalized mass transfer $B = \dot{m}_t\Delta H/\dot{q}_{hw} = 0.6$, β for the two gases differs by less than 10% and, in addition, the curves appear to coalesce at higher values of B. Since the measured values of the normalized mass-transfer parameter exceeded 0.6 for all test conditions reported in Ref. 1, it is highly doubtful that this suggested refinement in the technique would significantly improve the accuracy of the calculations.

In answer to the questions raised concerning the determination of the vapor injection rate, it must be pointed out that:

1) Vapor injection rates calculated from Eq. (A10) of Ref. 1 suffer the same high uncertainty level described earlier, because the equation also contains the reradiation term.

2) Energy stored within the char layer will, indeed, increase the magnitude of Δm_v, but this will be the same for the various time duration runs at a given stream condition, and thus the derivative $\Delta m_v/\Delta t$ will be unaffected. This multiple run technique, as discussed in Ref. 1, minimized transient effects that occur during the initiation of ablation.

The authors recognize the need for additional experiments as well as an extension and refinement of existing analyses in order to understand more fully the complicated physical and chemical interactions taking place in boundary-layer flows with ablation species present. Only then will the observed differences between experiment and theory be resolved. In this regard, additional tests of phenolic nylon for both radiative and convective heating in air and nitrogen have been recently completed at Ames,[5] and the results of these experiments are in substantial agreement with the data presented in Ref. 1.

The disagreement between existing theory and the results presented in Ref. 1 will now be re-examined. There is no reason to expect that the theory[3, 4] would agree with experiment in view of the simplifying assumptions employed in the derivation and solution of the differential equations. Specifically, analyses of the boundary-layer heat-transfer problem on the basis of the conservation equations presented in Ref. 3 may be questioned for very high mass transfer rates where the thermal boundary layer may be blown off. Another important factor, which also limits the applicability of the results contained in Ref. 3, even at low mass transfer rates, is the assumption that the Lewis (Le) and Prandtl (Pr) numbers are unity with the result that the total enthalpy and mass fractions of the individual chemical elements satisfy identical differential equations. This approach is regarded as proper only when the molecular weight (and hence transport properties) of the injected gases and boundary-layer species are comparable. However, for the case under consideration, the phenolic nylon vapors produced during ablation contain a large fraction of low molecular weight species (e.g., H and H_2) and the solutions of the conservation equations based on this coupling assumption are no longer valid. In fact, Lees has devoted an entire section of Ref. 4 (pp. 467–478) to the discussion of mixtures containing light gas components and concludes that "... clearly the approximation of constant average values of Pr and Sc across the boundary layer may be inadequate in this case and a more careful study is required ..." Moreover, the experiments performed by Barber for hydrogen injection as pointed out previously in Ref. 1 also serve to illustrate the limitations of the similarity approach. In the comparison of the experiment with theory, the nature of the reacting species (that is whether atomic or molecular oxygen is combining with the ablative vapors) plays a strong role in determining the extent of combustion heating. This choice influences the "upper limit" quoted in Ref. 1, and the discussion of Arne regarding this point is certainly pertinent to the interpretation of the results.

In view of the comments contained in this reply, the authors feel that the experimental results presented in Ref. 1 are valid and are not misleading. They further agree wholeheartedly with the opinion of Arne regarding the applicability of the theory, namely, its usefulness is limited to qualitative comparison.

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