$$A_{yy}{}^{*}F_{,xxxx} - B_{yx}{}^{*}w_{,xxxx} = 0 \tag{17}$$

where

$$F_{,yy} = N_0 = \text{const} \tag{18}$$

and $A_{yy}{}^{*}$, $B_{yx}{}^{*}$ are given by Eqs. (18) of Ref. 2.

Reducing Eqs. (16) and (17) to a single equation in terms of w, one gets

$$(A_{yy}{}^{*})^{-1}(B_{yx}{}^{*})^{2}\, w_{,xxxx} = p + N_0 w_{,xx} \tag{19}$$

which resembles Eq. (a) on p. 7 of Ref. 5 for finite cylindrical bending of homogeneous plates.

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Comments

Comment on "Characteristics of the Arc in a Gerdien-Type Plasma Generator"

M. T. Dooley,* W. K. McGregor,† and L. E. Brewer‡
ARO Inc., Tullahoma, Tenn.

In a recent technical note,[1] the authors have shown that in a Gerdien-type plasma generator exhausting into the atmosphere, where argon is the working fluid, the arc process is cyclic, and the observed flame consists of the envelope of many blown arc current paths moving about at high frequency. Measurements using equilibrium radiation concepts and based on the assumption of an ionized, current-free gas stream would be in error when applied to this stream. To provide a source of ionized gas free of current paths, the stream was expanded into a low pressure test cell (≈ 0.5 mm Hg) and the expanded flame carefully examined to determine whether the stream was influenced by the same blown arc phenomena. The same type of probe experiments as for the atmospheric case were performed.

The expanded luminous gas stream is shown in Fig. 1. The very bright section at the orifice exit contains the many blown arcs and is about the same size as the radiating jet at atmospheric pressure. The expanded flame does not contain the current paths, and electron velocity distributions found in the expanded region by Langmuir probes were Maxwellian. The expanded flame should, therefore, provide an acceptable source for further study of measurement techniques.

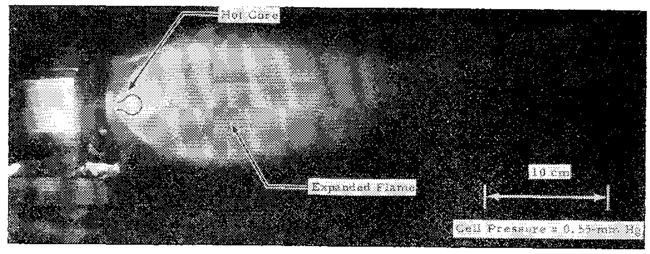

Fig. 1 Plasma generator exhausting to low pressure, showing hot core blown arc region and current free expanded flame

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* Research Engineer, Research Branch, Rocket Test Facility. Member AIAA.

† Project Engineer, Research Branch, Rocket Test Facility. Member AIAA.

‡ Research Engineer, Research Branch, Rocket Test Facility.

[1] Dooley, M. T., McGregor, W. K., and Brewer, L. E., "Characteristics of the arc in a Gerdien-type plasma generator," ARS J. **32,** 1392–1394 (1962).

Comments on "Treatment of Partial Equilibrium in Chemically Reacting Flow"

R. E. Mates*
Cornell Aeronautical Laboratory Inc., Buffalo, N. Y.

Libby[1] has presented a method for dealing with chemically reacting flows when approximate local equilibrium is maintained among some but not all of the chemical species present. The purpose of the present comments is to point out that the solution presented may be indeterminate in some cases.

The difficulty lies in the fact that the G_i are not all independent. The relationship between the G_i is most clearly seen if the N-L independent G_j are chosen as those for the reactions by which species 1, . . ., N-L are formed from the elements. This set of G_j must be independent, since each contains only one of the Y_i, $i = 1, \ldots, N\text{-}L$. It then can be shown that

$$1 - G_i = \prod_{j=1}^{N-L} (1 - G_j)^{\nu_{ij}' - \nu_{ij}''} \qquad i = N\text{-}L + 1, \ldots, K \tag{1}$$

The σ_i, which are functions of the rate constants, are all independent. Thus, in general, Eqs. (6) in footnote 1 will not all be linearly independent, and the M indeterminate σ_i cannot be found. This problem will not occur in all cases. If the reaction mechanism involves only N-L reactions, all of the G_i will be independent. Similarly if the species that are assumed to be in local equilibrium are each involved in only one reaction, the system of Eqs. (6) will be linearly independent. However, most real chemical mechanisms, particularly at high temperatures, involve many more than N-L reactions, and in these cases it is unlikely that a solution can be found.

Physically, this problem arises because once equilibrium is assumed it is no longer meaningful to compute contributions to gradients in species concentrations due to individual reactions. Once a species is assumed to be in local chemical equilibrium with some other species, its concentration can be

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* Assistant Mechanical Engineer and Assistant Professor, State University of New York, Buffalo, N. Y.

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