influenced by the body becomes larger than the actual one. In order to correct for this a shock shape must be introduced which closely approximates the actual shock. In the example of Fig. 2, at a Mach number of 2.5, a conical shock shape was used. The agreement between experimental and theoretical values of interference lift is good (Fig. 2).

The feature of the negative pressure coefficient ahead of the maximum cross section of the body, and the resulting negative interference lift region previously described is exhibited by most of the parabolic and power-law bodies of revolution (minimum drag bodies) used in supersonic flow. Therefore, it should be considered in the analysis and optimization of the forementioned interference configuration.

There is no effect of the wing upon the body for the spacing just considered. For closer spacing there is a negative lift acting on the body; however, the lift on the wing increases, and the total lift is still positive.

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Magnetic Induction Parameter for Lorentz Accelerators

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The thrust per unit cross section area p_f developed by Lorentz accelerators is in the first approximation equal to the cross product of the magnetic induction B and the linear electric current density j measured in the transverse plane of the flow:

$$p_f = j \times B = \dot{m}(v_2 - v_1) \tag{1}$$

It is also equal to the change in momentum of the working fluid with a mass flow density of $\dot{m}$ and with entrance and exit velocities of v_1 and v_2, respectively. Equation (1) is valid for the range in which secondary effects are negligible, i.e., as long as the magnetic induction B is small. The optimum amount of B which produces maximum thrust output with a given electric current density depends, therefore, on secondary effects. Inclusion of phenomena such as ion slip and Hall currents in the derivation of Eq. (1) leads to a complicated analysis.[1]

A different approach to this problem can be based on the hypothesis that secondary effects become significant when high efficiencies in the energy conversion process are attempted. The optimum amount for B can be determined directly from the change of available electric energy into kinetic energy of the working fluid. The electric power input per unit cross section area of the accelerator q has to be equal to or greater than the increase in kinetic energy of the working fluid plus the power required to increase its degree of ionization by the fraction $\Delta\alpha$:

$$q \geq \epsilon\dot{m}\Delta\alpha + 0.5\dot{m}(v_2^2 - v_1^2) \tag{2}$$

with ϵ being the ionization (and dissociation) energy of the working fluid. Equations (1) and (2) are combined to eliminate v_2:

$$(j \times B)/\dot{m} \leq \{2\epsilon[(q/\dot{m}\epsilon) - \Delta\alpha] + v_1^2\}^{1/2} - v_1 \tag{3}$$

Equation (3) can be used to determine the proper amount of the magnetic induction B for the experiment. Demetriades[2] and Ziemer determined the optimum amount of B experimentally for the specific conditions of their test stand and obtained $B = 1840$ gauss. Equation (3) yields for the same test conditions $B = 1780$ gauss, if a (certainly too large) $\Delta\alpha = 1$ is assumed arbitrarily. The experimentally determined amount of $B = 1840$ gauss, when introduced into Eq. (3), results for this specific test condition in a $\Delta\alpha = 0.75$ instead of the here-assumed $\Delta\alpha = 1$.

In the event that cross-field accelerators with high thrust output are under consideration, Eq. (3) can be simplified by neglecting v_1 and $\Delta\alpha$ against the other terms, and a magnetic performance parameter σ can be established:

$$\sigma = B(j/E\dot{m})^{1/2} = Bh(I/VM)^{1/2} \leq 2^{1/2} \tag{4}$$

with E being the voltage potential. In the second term, the distance h, the voltage drop V, and the total current I are measured between the electrodes of the accelerator, and M designates the total mass flow rate through the unit. This parameter σ may turn out to be useful not only in comparing performance characteristics of different $j \times B$ accelerators but also in the adjustment and calibration of local nonuniformities in the properties of the same unit.

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Earth Albedo Input to Flat Plates

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In this short note, the results of an analysis considering the earth reflected solar radiation incident upon a spinning flat plate are presented briefly. A general description of the problem is given, as well as a definition of all of the geometrical parameters, even though the final result itself is not given explicitly. However, the final integral expression is given, as well as the expressions for determining the integration limits. In actual practice, it proves to be rather easy to perform the integration with the aid of a computer. The parameters introduced succeed in defining the orientation of the surface with respect to the earth. No attempt is made here to give these parameters in terms of orbital parameters. Even so, unfortunately, it would not relieve the reader from the troublesome task of determining the remainder of the parameters from analysis of such data as time of launch, point of launch, injection angle, etc., for any particular problem that he may wish to consider.

Nomenclature

S = mean solar constant
$\mathbf{s}$ = solar vector

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