The errors which have resulted from the constant static pressure assumption in the past are one very probable reason for the past inability to achieve any kind of satisfactory correlation between flight test data and wind tunnel data and have undoubtedly slowed progress in obtaining a satisfactory theory for predicting the wake turbulence hazard.

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Reply by Author to J. F. Marchman

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Nomenclature

C_{PP} = pressure coefficient of a side port
P = pressure at a side port
P_S = static pressure
V = resultant velocity
ρ = density

MARCHMAN is incorrect in his statement that I assumed that the static pressure is constant through the vortex. My data were reduced in the following manner. The static pressure probe was calibrated by first considering the pressure coefficient at one of the side ports while the probe was in a uniform stream which is what the probe sees when aligned with the resultant velocity inside the vortex. We can express the pressure coefficient at a side port as

$$C_{PP} = (P - P_s)/\tfrac{1}{2}\rho V^2$$

The pressure difference between the stagnation point and the side port can also be expressed as

$$P_S + \tfrac{1}{2}\rho V^2 - P = \Delta P$$

Combining these two expressions results in

$$\tfrac{1}{2}\rho V^2(1 - C_{PP}) = \Delta P$$
$$V = (2\Delta P/[\rho(1 - C_{PP})])^{1/2}$$

where C_{PP} will be constant for the probe and position of the ports. As the procedure shows there was no assumption that the static pressure was constant.

The second value needed for the derivation of the axial and tangential velocities is the angularity of the resultant flow. The angularity was determined by independently measuring the inclination of the pressure probe once it was aligned with the resultant velocity inside the vortex. The inclination of the probe and the magnitude of the resultant velocity were then used to derive the axial and tangential velocities. A complete description of the probe and the experimental method can be found in Ref. 1.

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Comments on "Convergence Proof of Discrete-Panel Wing Loading Theories"

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THE Note[1] by J. DeYoung is unusual in that no reference to any of the vast number of published papers by workers other than himself in the very active field of thin-wing loading appears. In general, this can hardly be regarded as in the best interests of scientific method; but in this case it happens to be particularly important because even a brief acquaintance with the current literature would have shown the author that the inversion of the loading matrix—whose elements are given (in the notation of Ref. 1) by: $1/(2m - 2n + 1)$ is only a trivial part of the problem since the result is known.

In fact, it is quoted as an example problem in a textbook by Isaacson and Keller.[2]

Furthermore, through communication from W. P. Jones the writer subsequently found that this result dates (at least) back to the work of A. R. Collar[3,4] in 1950. That the essential result for the inversion was known was reported in Ref. 5 and has subsequently been widely circulated and quoted (e.g., Refs. 6–8).

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