Comment on "Unification of Matrix Methods of Structural Analysis"

BERTRAM KLEIN*
Hughes Aircraft Company, El Segundo, Calif.

RECENTLY, Filho[1] presented a brief discussion attempting to illustrate the equivalence of certain methods of matrix structural analysis. Only one simple example was presented based on a very early paper of the present writer. It was claimed that the method being developed by the present author is synonymous with other methods.

The purpose of the present note is to state some important differences between this method and others. These differences have been shown already in work of the present author.[2, 3] They are as follows:

1) It is not necessary to use a lumped discrete element idealization in applying the method. The structure can be represented as it really is in nature. Orthotropic or aeolotropic plate and shell theory are useful in this respect.

2) Either a stiffness or a flexibility formulation can be used, or both can be used, as desired, in the same problem.

3) The equations are written in terms of definite integrals or derivatives of functions such that the results are very accurate.

4) Any kind of special equation can be written, such as continuity, boundary condition, etc. In other words, there is more freedom in the choice of equations and in the order of writing down the equations.

5) Both equilibrium and structural continuity are satisfied directly simultaneously.

Therefore, it is necessary to study the foregoing items before drawing any conclusions.

References

[1] Filho, F. V., "Unification of matrix methods of structural analysis," AIAA J. **1**, 916–917 (1963).

[2] Klein, B., "A simple method of matric structural analysis," J. Aerospace Sci., Part III **25**, 385–394, Part IV **26**, 351–359, Part V **27**, 859–866, Part VI **29**, 306–310 (1959–1961).

[3] Klein, B., "A simple method of matric structural analysis," Parts VII and VIII (to be published).

Received May 22, 1963.

* Staff Engineer, Aerospace Group, Space Systems Division.

Reply by Author to B. Klein

FERNANDO VENANCIO FILHO*
*Instituto Tecnológico de Aeronáutica,
São Paulo, Brazil*

THE main purpose of the writer in presenting the article commented upon by Klein was to demonstrate that "Argyris' equations are exactly Klein's after the ideal pre-triangularization is obtained."[1]

Regarding item 1 of Klein's comments, in the papers Klein has so far published only a lumped discrete element idealization is used. The writer is looking forward to the publication of parts VII and VIII of Klein's work to learn how "the structure can be represented as it really is in nature." It must be stated, however, that plates and shells have already been treated by matrix methods.[2]

Items 2–5 of Klein's comments appear to the writer to be features that are more or less present in any method of analysis of linear elastic structures. In fact, all these methods have their basis in the old principles of Maxwell, Mohr, and Mueller-Breslau. The proliferation of methods of structural analysis must lead us to search for what is fundamentally new in a method and not to be blinded with formal details.

Received July 8, 1963.

* Associate Professor, Aeronautical Engineering Division.

References

[1] Filho, F. V., "Unification of matrix methods of structural analysis," AIAA J. **1**, 916–917 (1963).

[2] Hessel, A., "Analysis of plates and shells by matrix methods," Svenska Aeroplan Aktiebolaget TN 48 (1961).

Correction to "Special Solutions to the Equations of Motion for Maneuvering Entry"

PAUL D. ARTHUR* AND BRUCE E. BAXTER†
Lockheed-California Company, Burbank, Calif.

IN Ref. 1, Jackson presented a very useful technique for analytical analysis of the lateral maneuver. His final Eq. (12) should be corrected, however. Combining his Eqs. (4) and (11) to eliminate the heading angle and to express the longitude θ in terms of the latitude ϕ for an equatorial entry ($Q = 1$) yields

$$d\theta = \frac{d\phi}{\cos\phi}\left(\frac{1 - \sin\phi}{2\sin\phi}\right)^{1/2} \tag{1}$$

Integrating,

$$\sin\theta = \left(\frac{2\sin\phi}{1 + \sin\phi}\right)^{1/2} \tag{2}$$

which replaces Eq. (12) of Ref. 1.

Reference

[1] Jackson, W. S., "Special solutions to the equations of motion for maneuvering entry," J. Aerospace Sci. **29**, 236 (1962).

Received June 17, 1963.

* Consultant, Spacecraft Organization. Member AIAA.

† Senior Thermodynamics Engineer, Spacecraft Organization Member AIAA.

Comment on "Turbulent Mixing of Compressible Free Jets"

RICHARD S. ROSLER*
United Aircraft Corporation, Sunnyvale, Calif.

IN a recent technical note,[1] Maydew and Reed give some of the results of an experimental investigation that they conducted.[2] They point out that considerable effort was devoted to trying to fit the data (by the *right choice* of σ, the jet-spreading parameter) to the error function distribution and also to Crane's (or Gortler's) incompressible solution with the result that Crane's profile gave the best fit. The purpose of this note is to mention a much easier method of determining σ than that of having to make various choices for σ and then compare the data with an appropriate theoretical solution.

For purposes of determining the virtual origin of the mixing region, Maydew and Reed (Ref. 2, p. 21) plotted the mixing region width $b_{0.1}$ vs x, the axial distance. The width $b_{0.1}$ is by definition the radial distance between the points where $(V/V_1)^2$ is 0.1 and 0.9. The data were given as

$$b_{0.1} = C(x + a)$$

Received July 9, 1963.

* Aerothermo Specialist, United Technology Center Division. Associate Member AIAA.