## Some Considerations on Thermal Shock Problems in a Plate[1]

**P. Puri.**[2] The authors have discussed an important problem in thermoelasticity and have brought out some very interesting features of the problem.

However the authors' conclusion that Singh's solution is valid only for a short time is not entirely correct. The displacement solution in [1] (authors' reference [4]) is valid only for the time that it takes the wave front to reach the other end of the plate, but the expression for stress is valid for all times. Further Puri [2] (authors' reference [5]) corrected the oversight in [1] and obtained a bounded solution for the displacement, which is valid for all times.

### References

1 Singh, A., and Puri, P., "Dynamic Thermal Stresses in an Infinite State," *Arch. Mech. Stosw.*, Vol. 15, 1963, pp. 77–88.

2 Puri, P., "One-Dimensional Dynamic Problems of Thermoelasticity." *Arch. Mech. Stosw.*, Vol. 16, 1964, pp. 93–102.

### Author's Closure

We understand Professor Puri's comment. In our first impression we imagined that actual time $t = 100$ is pretty small in dimensionless time; then we considered his result. We agree with his opinion; however, there are still the following important features in our paper:

*i* In industry, it is more important to find solution of $\sigma_{yy}$ instead of $\sigma_{xx}$.
*ii* For realistic materials, dynamic effects have disappeared, but the coupling effects have clear effects. For example, some axisymmetric thermal stress problems have about 30–40 percent deviations in stress distributions [1] when the coupling is taken into account.

### References

1 Takeuti, Y., and Tanigawa, Y., "On a New Method for Axisymmetric Thermoelastic Problems," *Journal of Thermal Stresses*, Vol. 4, No. 3, 1981.

[1] By Y. Takeuti and T. Furukawa, and published in the March, 1981, issue of the ASME JOURNAL OF APPLIED MECHANICS, Vol. 48, pp. 113–118.

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## Stress Concentrations in Cylindrically Orthotropic Composite Plates With a Circular Hole[1]

**C.H. Parr**[2]. Professor Hoff has given some interesting insights into a basic problem area for composite materials. However, I would give a different interpretation to the root $p_3 = 2$ in equation (56).

The case resulting from taking $n = 0$ in the stress function $\phi$, equation (7), is axisymmetric stress but not axisymmetric displacement. The term $p_3 = 2$ corresponds to a tangential displacement of the form

$$v = \text{constant} \times r\,\theta.$$

The boundary conditions (54) need only be supplemented by another boundary condition,

$$v \equiv 0,$$

for the dilemma to be resolved. The root $p_3 = 2$ results in a displacement distribution that is multivalued and not unique. However, *it is not a spurious solution* as indicated by Professor Hoff.

### Author's Closure

Mr. Parr's discussion deals largely with a matter of semantics but it leads to an explanation of the conclusion of the paper that a state of constant stress $\sigma_r = \sigma_\vartheta = C =$ constant, $\tau_{r\vartheta} = 0$ cannot exist in a cylindrically orthotropic circular plate (without a hole) subjected to a constant radial traction $C$ at its outer edge $r = R$ except when $S_{rr} = S_{\vartheta\vartheta}$. The relations

$$\phi = (C/2)r^2 \quad u = C(S_{rr} + S_{r\vartheta})r \quad v = C(S_{\vartheta\vartheta} - S_{rr})r\vartheta$$

represent a solution if a sector has been cut out of the plate between $\vartheta = 2\pi - \alpha$ and $\theta = 2\pi$ (provided that a circumferential traction $C$ is applied to the two edges so created); but this solution is not admissible when the circular plate is complete (uncut) because then two different values are obtained for $v$ at $\vartheta = 0$ and $\theta = 2\pi$. The only exception is the case when $S_{rr} = S_{\vartheta\vartheta}$ because then $v$ vanishes identically.

Incidentally, an error in the original text should be corrected. On page 568, under the section "Discussion of Results," on the third line of the second paragraph, the word "uniaxial" should be replaced with the word "radial."

[1] By N.J. Hoff, and published in the September, 1981, issue of the ASME JOURNAL OF APPLIED MECHANICS, Vol. 48, pp. 563–569.

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