correlating the turbulence output signal from the anemometer. The auto-correlations were computed in real time and plotted on an $X - Y$ plotter using different time delay ranges. The shedding frequency is readily obtainable from the auto-correlograms. The accuracy of the correlator was 2%. Grids of different geometrical configurations located at various distances upstream from the cylinder were used to study the effect of the freestream turbulence level and of scale on the frequency of eddy-shedding. The turbulence level ranged from about 0.5% for the clear tunnel to about 12.5%. Over the entire range of Reynolds number and turbulence intensity, the Strouhal number remained virtually constant at 0.205 ± 0.005. Similar experiments with square cylinders at zero angle of attack with the freestream indicated no noticeable effect of the turbulence intensity on the Strouhal number. It may be noted that for square cylinders the position of separation is fixed, and not dependent on the Reynolds number or the turbulence level.

In view of the preceeding findings, we suggest that the freestream level is not a significant factor in causing the large scatter in the data reported in Ref. 1. The shear parameter λ seems to be of primary importance. Also, since the flow past cylinders exposed to sheared freestream is distinctly three-dimensional, there appears to exist no reason a priori why Roshko's results for almost two-dimensional flow should apply in this case.

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Reply by Author to Mujumdar and Douglas

C. F. Chen*
Rutgers University, New Brunswick, N.J.

IN OUR experiment, the shear parameter λ is defined in terms of the tunnel height H, i.e.,

$$\lambda = (H/U_c)(dU/dy)$$

when U_c is the centerline velocity. The value of λ was found to be about 0.57. The shear parameter λ' based on the diameter d of the cylinder is

$$\lambda' = (d/U_c)(dU/dy) = \lambda(d/H) \sim 0.003$$

for the cylinders used. This means that in a vertical distance of 10 diameters, the velocity change is about 3%. With this fact in mind, it may not be too surprising to find that Roshko's correlation for uniform flow applies equally well in our case if the local values of Strouhal and Reynolds numbers are used. In view of Mujumdar's work on the effect of turbulence on vortex shedding, we should have blamed the scatter on our measuring technique (which is definitely not as sophisticated as that of Mujumdar) rather than the turbulence level.

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* Professor, Dept. Mechanical & Aerospace Engineering.

Comment on "Does the Center of Flexure Depend on Poisson's Ratio?"

David B. Hall*
Boeing Company, Vertol Division, Philadelphia, Pa.

THE author[1] defines "center of flexure" in a manner contrary to the usual definition, and the particular property (dependence on Poisson's ratio) which the note examines happens to be exactly reversed by his definition. A partial definition is given at the beginning of the third paragraph and, slightly paraphrased, reads, "The center of flexure is whereever the load is applied." See also Eq. (10). A meaningful definition ought to say that the center of flexure is where the load must be applied to produce some prescribed effect. The accepted definition prescribes that the beam should deflect without twisting.† The author, instead, adds to his definition the statement "The natural requirement of bending by transversal vertical force is that the resultant moment due to horizontal shear stresses is zero." This definition is repeated mathematically in Eq. (5).

The fact that this definition contradicts universal usage is most easily illustrated by referring to a "thin-walled open section." In the absence of twisting, the shear is approximately uniform across the thickness and parallel to the boundaries. In a typical case (Fig. 1) the shear in the flanges *does* produce a moment, forcing the resultant vertical force completely outside the section. Furthermore, torsional shears to cancel this moment [Eq. (9)] would, of course, produce pronounced twisting. The remaining development is based on Eq. (5) and therefore invalid, and leads to a conclusion that is known to be wrong.

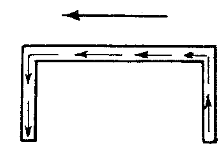

Fig. 1 Flexural center of open section.

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* Senior Engineer, Structural Technology.

† Since bending deforms the cross section a precise definition requires further refinement, as explained, for example, in Ref. 2, where, incidentally, Poisson's ratio does appear in the resulting expressions.

Reply by Author to D. B. Hall

Toma D. Leko*
Stone and Webster Engineering Corp., Boston, Mass.

THE first sentence of D. B. Hall's comments states that the particular property of the center of flexure (independence of Poisson's ratio) is exactly reversed by the

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* Engineer, Nuclear Division.