Authors' Closure

We wish to thank the discussers for their interest in our study. We agree that our paper may also be applied in the case of macrophotography of coarse grids. However, we caution the reader regarding the range of applicability of our analysis. We have confined our attention to an experimental apparatus that is constructed in a manner so that only light rays nearly parallel to the optical axis contribute to the image; this is not always the case for scattered-light photoelasticity.

In the remainder of our closure we address the discussers' numbered comments.

1. We thank the discussers for calling specific attention to the fact that, for our static example, the effect of optical refraction is small for Poisson's ratio near $1/2$. Refraction effects are expected to be small for the great majority of experiments involving substances that are relatively incompressible.

2. The discussers refer to a paper reporting results obtained for a diametrically loaded sphere of urethane rubber (Hysol 8530CH). The value of Poisson's ratio reported for this rubber is 0.485, which is very near $1/2$, and, therefore, one would expect little effect of optical refraction to be apparent in this experiment. Using the dilatation data presented in that paper, we have made a rough estimate of approximately 6 percent as an upper bound on the error in strain determination due to optical refraction. Even this upper bound is nearly within experimental uncertainty; hence, we would expect the optical refraction feature to go unnoticed.

3. We have examined Ref. 2; however, the results presented for the buttress dam are qualitative and provide us no opportunity to assess optical refraction effects.

4. The paper cited by the discussers reports experiments conducted with coarse grids (125 times the pitch used by the authors) embedded in thin models of urethane rubber. We would not expect

the effect of optical refraction to be apparent under these circumstances.

5. We wish to emphasize that, in our study, the displacements observed with the embedded grid moiré technique were *strikingly different in character* from displacement measurements made with a capacitance gage. Since the observations were made on the axis of symmetry, the capacitance-gage electrode radius ($1/8$ in.) was small compared to the radius of curvature of the observed wave (greater than $1/2$ in.), and confidence in the capacitance-gage electronics had been gained in Hopkinson-bar experiments, we can conceive of no discrepancy in the capacitance-gage measurements sufficiently large to account for this difference in character. We attribute the difference to the effect of optical refraction.

6. The spherically expanding wave considered in our paper is a simple analytically tractable illustration of dynamic internal-refraction effects. Clearly, a more complex analysis is needed for an exact description of our pellet-impact experiment. However, as shown by Fig. 11 of our paper, the spherically expanding wave model describes the dominant character of the experiment even for the observations made nearest the point of impact.

7. One of the authors (J. S. Whittier) has made dynamic-strain measurements using the embedded-grid moiré technique for a situation where the theoretical strains are well known, namely, the case of uniaxial-strain wave propagation under step-function loading. Preliminary results indicate that errors in strain measurement due to optical refraction are large.

As previously stated, the optical system for scattered-light photoelasticity may differ in character from that considered in our paper, due to the multiplicity of ray paths involved in the image formation. A comprehensive analysis of the distortion of such an image would be a large task since the image will be diffused, as well as displaced.

ERRATA:

Two Systems for Automatic Reduction of Time-dependent Photomechanics Data

by Charless W. Fowlkes

It has been brought to our attention that the diagrams for Fig. 2 and Fig. 8 on pages 65 and 69, respectively, of the February 1970 issue of E/M, have been interchanged. The captions are correct as they stand.

The Editors