

## AUTHORS' CLOSURE TO DISCUSSION† BY J. P. CARTER

J. R. OSIAS and J. L. SWEDLOW

Department of Mechanical Engineering, Carnegie-Mellon University, Pittsburgh, PA 15213, U.S.A.

We appreciate Carter's point that choice of stress and strain rates in a hypoelastic model may affect resultant load-deflection response. Of course, models employing distinct rates can be made equivalent—or quite different—by suitable definition of material properties. Zeroth order models such as Carter's and ours describe elastic behavior in a general sense and can correspond strictly to Hooke's law only in the limit of vanishing deformation. For such deformations his second model is fully equivalent to ours and is equally appropriate to description of elastic deformation of metals. Our large strain zeroth order hypoelastic results were reported simply to demonstrate a solution procedure and were not intended to exemplify an actual material.

It should be noted that Carter's first model involves proportionality between changes in deformation and Cauchy stress. Unlike our formulation this is not objective and is thus admissible only for wholly irrotational deformation, irrespective of solution method or incremental deformation magnitude.

†J. R. Osias and J. L. Swedlow, Finite elasto-plastic deformations—I. Theory and numerical examples. *Int. J. Solids Structures* 10, 321 (1974).