Erratum

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Erratum to: Clarification of terminology used in the paper: path-dependent J-integral evaluations around an elliptical hole for large deformation theory

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Erratum to: David J. Unger. 2016. Clarification of terminology used in the paper: path-dependent J-integral evaluations around an elliptical hole for large deformation theory. *Journal of the Mechanical Behavior of Materials*. Volume 25, Issue 3–4, pages 77–81. (DOI 10.1515/jmbm-2016-0008):

Use of some nonstandard terminology by the author of this paper has resulted in confusion among certain individuals who have read the preprint. The author apologizes for any misunderstanding generated by his impreciseness and will attempt to clarify his semantics here.

The perfectly plastic material analyzed in this paper is subject to nonproportional straining. The natural or logarithmic strain used in this analysis is

$$\varepsilon_{\alpha\alpha}^{\log} = \ln\left(1+\frac{v_0 t}{R+F(\alpha)}\right), \quad t \geq 0, \quad t \text{ monotonically increasing,} \tag{1}$$

where v_0 is velocity (constant) and t is the loading (straining) parameter taken here as time for simplicity. Nonproportional loading is commonly cited as the reason for path-dependence in J-integrals for crack and notch problems involving flow theories of plasticity. The same is true in this paper. The author refers to this material as nonlinear elastic simply because there is no unloading or relaxation with time. Strictly speaking, this is a misnomer as no strain energy potential W exists from which stress may be derived $\sigma_{ij} \neq \frac{\partial W}{\partial \varepsilon_{ij}}$. Conventional continuum mechanics terminology would not classify this material as elastic, nor would any conservation law necessarily hold true that is a generalization of the J-integral for finite deformations.

Note, however, that the plastic material used in this paper satisfies a material stability criterion as it produces no negative rate of plastic work at any time or location. In addition the lower bound theorem and upper bound theorem of classical plasticity are satisfied.

For small values of displacement $v_0 t \ll 1$, the natural strain (1) becomes a proportional strain (2), upon expansion in a Taylor series and retention of the first term, i.e.

$$\varepsilon_{\alpha\alpha} = \frac{v_0 t}{R+F(\alpha)}, \quad t \geq 0, \quad t \text{ monotonically increasing.} \tag{2}$$

In which case, the J-integral would become path-independent.

Errata:

The upper limit on integral (14) should have read

$\cos^{-1}(b/a)/\sqrt{1-(b/a)^2}$ instead of $\cos^{-1}(b/a)/\sqrt{a^2-b^2}$.

The version of the software Mathematica should have read Mathematica® 7.0 instead of Mathematica® 1.0.

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