$$\sigma_{zm} = \left(\frac{E'_m}{Z}\right)\frac{\partial\phi_e}{\partial z} \tag{26}$$

$$\tau_{zxm} = \left(\frac{G_m}{F}\right)\frac{\partial\phi_e}{\partial x} \tag{27}$$

$$\tau_{zym} = \left(\frac{G_m}{F}\right)\frac{\partial\phi_e}{\partial y} \tag{28}$$

Furthermore, letting the analog device dimensions be (a,b,c) and letting the composite solid dimensions be (a_l,b_l,c_l), all aspect ratio correspondences may be found by combinatorial division of the following expressions:

$$a_l = Fa \tag{29}$$

$$b_l = Fb \tag{30}$$

$$c_l = Zc \tag{31}$$

e.g., $a_l/b_l = a/b$ and $b_l/c_l = (F/Z)b/c$. It is further convenient to let the analog device aspect ratios a/c and b/c be represented as

$$a/c = \alpha \tag{32}$$

and

$$b/c = \beta \tag{33}$$

Using Eqs. (29-33) one finds

$$a_l/c_l = (F/Z)\alpha \tag{34}$$

$$b_l/c_l = (F/Z)\beta \tag{35}$$

and

$$a_l/b_l = \alpha/\beta \tag{36}$$

Thus in order to predict results over large material and geometry ranges for the composite solid (for a given damage configuration), one must be able to change α and β as easily as possible (once again note that $(F/Z)^2 = E'_m/G_m$). To this end the electrolyte depth can control b_l, and a_l can be controlled by constructing the analog device such that the width a can be easily adjusted (it may be more convenient to adjust c rather than a). It also appears that the easiest way to control F and Z is to vary the electrolyte resistivity. Other ingenious experimental setups may permit more efficient variation of other primitives.

Summary

It has been shown that

1) The composite solid/analog device *affine* equations are elastically and electrically *material independent*.

2) The analog experimental solutions for a given damaged state and given boundary conditions can yield the stress and displacement fields of the composite solid for a wide range of physical variables.

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Errata: "An Alternating Method for Analysis of Surface-Flawed Aircraft Structural Components"

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THE information contained in the footnote on page 749 of this article is incorrect. The footnote should read: "Presented as Paper 82-0742 at the AIAA/ASME/ASCE/AHS 23rd Structures, Structural Dynamics, and Materials Conference, New Orleans, La., May 10-12, 1982."

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