$$+ \frac{2}{r} \frac{\partial}{\partial z} \left(\frac{\partial \psi}{\partial r} - \frac{2\psi}{r} \right) \frac{\partial}{\partial z} \left(\frac{\bar{\sigma}}{\bar{\bar{\epsilon}}} \right) \tag{23}$$

$$+ 2 \frac{\partial}{\partial z} \left(2 \frac{\partial \psi}{\partial r} - \frac{\psi}{r} \right) \frac{\partial^2}{\partial r \, \partial z} \left(\frac{\bar{\sigma}}{\bar{\bar{\epsilon}}} \right) = 0$$

where the operators ∇_1 , ∇_2 and ∇_3 are defined as (these operators are equivalent to the standard Laplacian operator, except for the indicated sign changes).

$$\nabla_1^2 = \frac{\partial^2}{\partial r^2} - \frac{1}{r} \frac{\partial}{\partial r} + \frac{\partial^2}{\partial z^2}$$

$$\nabla_2^2 = \frac{\partial^2}{\partial r^2} + \frac{1}{r} \frac{\partial}{\partial r} - \frac{\partial^2}{\partial z^2}$$

$$\nabla_3^2 = \frac{\partial^2}{\partial r^2} - \frac{1}{r} \frac{\partial}{\partial r} - \frac{\partial^2}{\partial z^2}$$

Equation (23) represents the governing equation for determining the displacement function ψ , and is predicated on the existance of proportional straining, equation (4). If the total derivatives had been retained in the flow law equations, and if the velocities $\dot{u}$ and $\dot{w}$, acting in the radial and axial directions, respectively, are defined as