

Problem H

The thermoelastic form of Hooke's law is given by

$$\underline{\underline{\epsilon}} = \frac{1+\nu}{E} \underline{\underline{\sigma}} - \frac{\nu}{E} (\text{tr } \underline{\underline{\sigma}}) \underline{\underline{1}} + \alpha (\theta - \theta_0) \underline{\underline{1}}$$

where

$\underline{\underline{\sigma}}$ ~ Cauchy stress

$\underline{\underline{\epsilon}}$ ~ small strain tensor

θ ~ temperature,

E ~ Young's modulus,

ν ~ Poisson's ratio,

α ~ coefficient of thermal expansion.

Using direct tensor notation or indicial notation, carry out the details of inverting the above expression by writing stress as a function of strain. Leave your answer in terms of E , ν , and α .