NOTE ON A PAPER BY J.R.M. RADOK*

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It is of interest to note that the complex variable solution of the equations of dynamic plane elasticity recently derived by Radok† can be arrived at by splitting the displacement field by the classical decomposition

$$u = \frac{\partial\phi}{\partial x} + \frac{\partial\psi}{\partial y}, \qquad v = -\frac{\partial\psi}{\partial x} + \frac{\partial\phi}{\partial y}$$

and noting that the wave equations

$$c_1^2\nabla_1^2\phi = \ddot{\phi}, \qquad c_2^2\nabla_1^2\psi = \ddot{\psi}$$

to which they lead have solutions of the form

$$\phi(x - ct \pm i\beta_1 y), \qquad \psi(x - ct \pm i\beta_2 y)$$

with $\beta_1^2 = 1 - c^2/c_1^2$, $\beta_2^2 = 1 - c^2/c_2^2$. The details are given in a paper published a few years ago**. Radok's solution (4.4) is immediately derivable from my equation (8) by replacing my f' and g' by $-\phi/\mu$ and $i(1 + \beta_2^2)\psi/(2\mu\beta_2)$ respectively.

AN ALTERNATE SOLUTION OF STEFAN'S PROBLEM‡

BY

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The author, using a simple transformation, has solved two cases of Stefan's problem. These problems have been solved earlier by Stefan [1] and by Neumann [1] by other methods. There are a number of problems governed by the parabolic differential equation with a moving boundary condition. Such a problem is the melting of a solid in which case a finite heat sink exists at the position of the moving boundary. A similar problem exists in certain crystalline transformations. These problems, known as moving boundary problems or Stefan's problems, also arise in studies of gravity drainage and seepage of oil from sand beds during pumping.

The first problem considered here is the same as that studied by Stefan, being the case of a solid initially at the melting point with one face brought instantaneously to some temperature above the melting temperature and held constant thereafter. The remaining sides are considered as insulated so that the heat flow is one dimensional.

The second problem is the same as that discussed by Neumann, i.e., the moving boundary problem for a semi-infinite bar initially at a constant temperature *below* the

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†J. R. M. Radok, Quart. Appl. Math. XIV, 289 (1956).

**I. N. Sneddon, Rend. Circ. Mat. Palermo, (*ii*) 1, 57 (1952).

‡Received January 31, 1957.