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## Engineering & Technical Services Division



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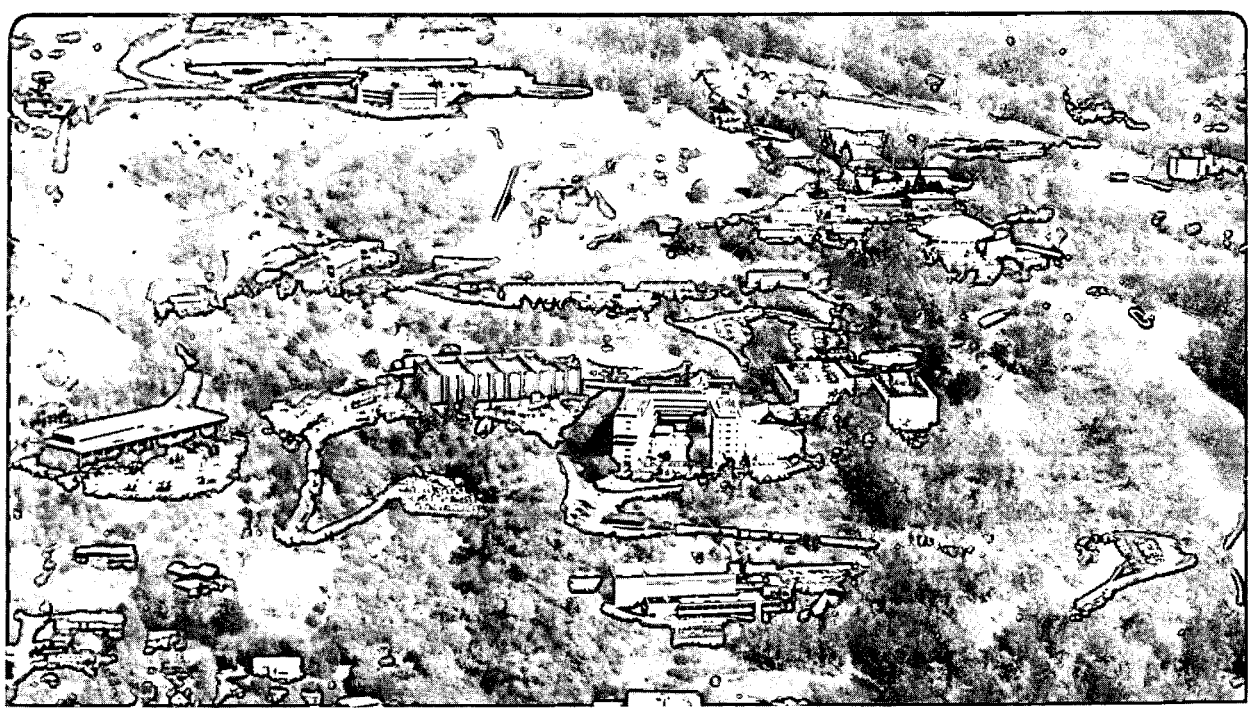

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**ENGINEERING NOTE**

| CODE | SERIAL | PAGE |
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| MD1111 | M5439A | 1 OF 1 |

| AUTHOR | DEPARTMENT | LOCATION | DATE |
|---|---|---|---|
| R. Meuser | Mech | Berk | Dec 5 1979 |

PROGRAM — PROJECT — JOB
High Field Magnet Development

Structural Analysis

TITLE
# Deflections of a Thick Ring with Multipole-Magnet-Like Loads.

A revision, 11-3-80. Exponents changed

In a previous note (Ref 1), formulas for stresses were presented for surface normal and shear forces varying as $\cos n\theta$ and $\sin n\theta$. With the stresses known, the deflections can be calculated from the formulas given in (Ref 2), namely:

$$u = \frac{r}{E}\Big\{ \left[(-n+2)A_1 r^n - nB_1 r^{n-2} + (n+2)C_1 r^{-n} + nD_1 r^{-n-2}\right] + \nu\left[(-n-2)A_1 r^n - nB_1 r^{n-2} + (n-2)C_1 r^{-n} + nD_1 r^{-n-2}\right]\Big\}\cos n\theta$$

$$v = \frac{r}{E}\Big\{ \left[(n+4)A_1 r^n + nB_1 r^{n-2} + (n-4)C_1 r^{-n} + nD_1 r^{-n-2}\right] + \nu\left[n A_1 r^n + nB_1 r^{n-2} + n C_1 r^{-n} + nD_1 r^{-n-2}\right]\Big\}\sin n\theta$$

(Note: These have been translated from the nomenclature used in Ref. 2 into that of Ref. 1 and rearranged. Apparently there is an error in formulas as presented in Ref 2; the stresses, Hook's Law equations, and deflections are not compatible. The above equations are correct.)

The constants $A_1, \ldots, D_1$ are evaluated from the loads using the formulas in Ref. 1

Ref 1 Eng. Note. M5255, Meuser, Oct 23 1978

Ref 2 Handbook of Engineering Mechanics, W. Flügge, 1st Ed. (1962) pp. 37-17,18.

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