the predicted magnetization due to porosity is small and can be superposed on the actual strain induced anisotropy results. This correction will be obtained from the previously discussed numerical hydrostatic prediction by using, instead of the hydrostatic pressure, the mean pressure

$$\overline{P} = \frac{\sigma_x + 2\sigma_y}{3} .$$

This correction cannot be added directly but must be weighted since the full correction is realized only when the material is initially in magnetic saturation. In fact, when the strain induced anisotropy predicts

$$\frac{M}{M_s} = \frac{\pi}{4} ,$$

the correction will be zero since this is exactly the average value of $\cos\psi$

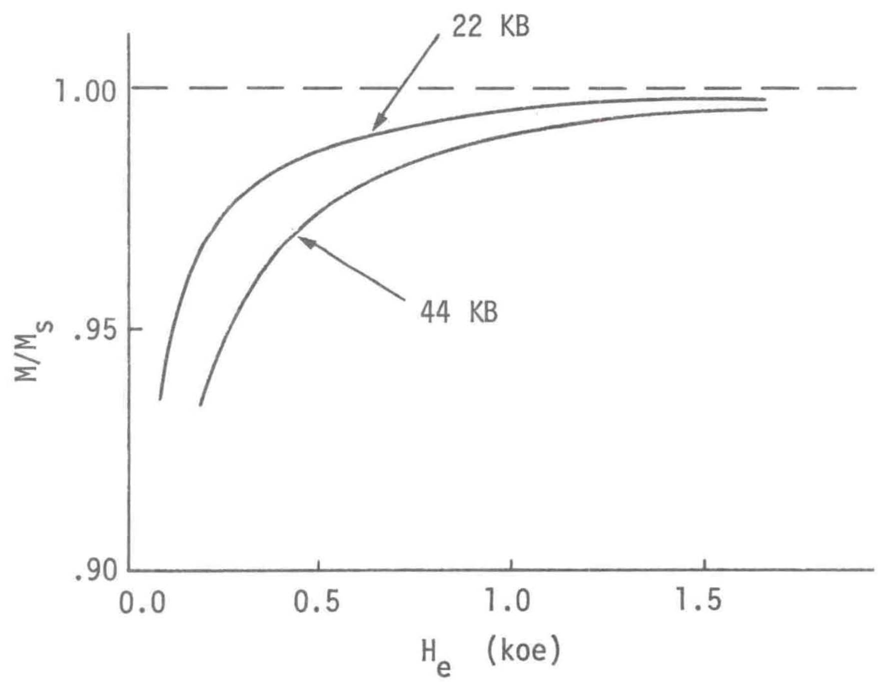

Fig. 3.6.--Magnetic hydrostatic pressure dependence of 3% porous yttrium iron garnet.

distributed around a spherical pore. Thus, the magnetization will be

$$\frac{M}{M_s} = f(e,H_e) + w(M/M_s)\Delta(\overline{P},H_e)$$

where $f(e,H_e)$ is the strain induced anisotropy prediction (Equation (3.12) for the interacting grain theory and Equation (3.14) for the independent grain theory), $\Delta(\overline{P},H_e)$ is the full numerical porosity correction, and $w(M/M_s)$ is the weight factor. The correction is assumed to be small so a linear approximation of $w(M/M_s)$ will be used. Since

$$w(1) = 1$$

and

$$w(\pi/4) = 0,$$

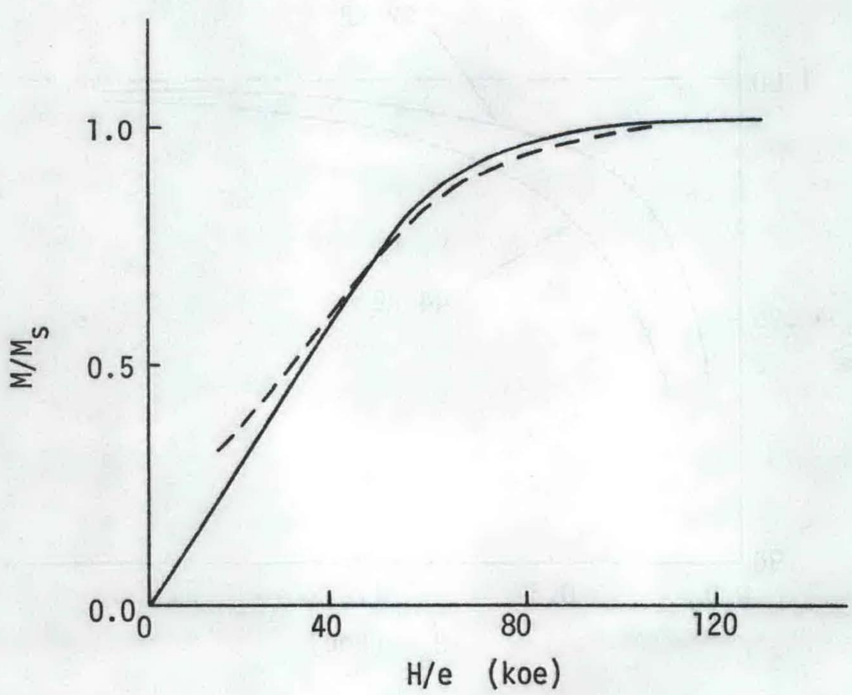

Fig. 3.7.--Correction to independent grain assumption due to 3% porosity.