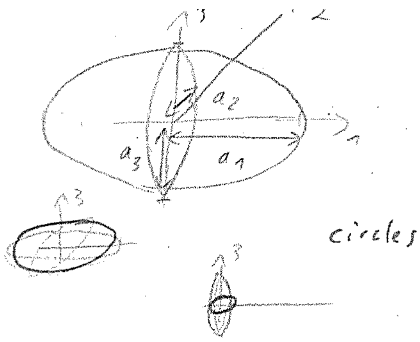
Representations of $\mathbb{E}, \mathbb{P}, \mathbb{A}$



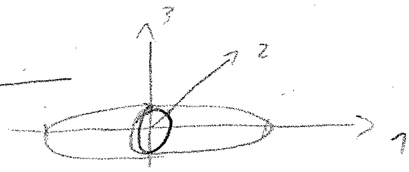
a_i alligned with e_i-ax.

Spheroid $\hat{=}$ Ellipsoid with two axes being equal

Oblate spheroid $\hat{=}$ Ellipsoid with $a_1 = a_2 > a_3$

Prolate spheroid $\hat{=}$ " " $a_1 = a_2 < a_3$

Spheroid with $a_2 = a_3$ and aspect ratio a



$$a = \frac{a_1}{a_3} \quad \hat{=} \text{ aspect ratio}$$

Brylka Diss. P. 34 (prolate spheroid) or Castaneda 1997 p. 288

Polarization tensor $\mathbb{P}_m = \mathbb{E}\, \mathbb{C}_m^{-1}$

$$\mathbb{P}_m = \begin{bmatrix} r & m & m & 0 & 0 & 0 \\ & k+p & k-p & 0 & 0 & 0 \\ & & k+p & 0 & 0 & 0 \\ & & & 2p & 0 & 0 \\ & \text{sym} & & & 2q & 0 \\ & & & & & 2q \end{bmatrix} \mathbb{B}_i \otimes \mathbb{B}_j$$

(Normalized Voigt notation) $ij \in [1..6]$

with

$$:= h(a) = \begin{cases} \dfrac{a\left[\arccos(a) - a\sqrt{1-a^2}\right]}{(1-a^2)^{3/2}} & \text{if } a \leq 1 \\[2ex] \dfrac{a\left[a\sqrt{a^2-1} - \operatorname{arccosh}(a)\right]}{(a^2-1)^{3/2}} & \text{if } a \geq 1 \end{cases}$$

$$k = \frac{G_m(7h - 2a^2 - 4a^2h) + 3K_m(h - 2a^2 + 2a^2h)}{8\underbrace{(1-a^2)\, G_m (4G_m + 3K_m)}}$$

$$m = \frac{(G_m + 3K_m)(2a^2 - h - 2a^2h)}{4\underbrace{G_m(1-a^2)(4G_m + 3K_m)}}$$

$$r = \frac{G_m(6 - 5h - 8a^2 + 8a^2h) + 3K_m(h - 2a^2 + 2a^2h)}{2\underbrace{G_m(1-a^2)(4G_m + 3K_m)}}$$

$$p = \frac{G_m(15h - 2a^2 - 12a^2h) + 3K_m(3h - 2a^2)}{16\underbrace{G_m(1-a^2)(4G_m + 3K_m)}}$$

$$q = \frac{2G_m(4 - 3h - 2a^2) + 3K_m(2 - 3h + 2a^2 - 3a^2h)}{8\,G_m(1-a^2)(4G_m + 3K_m)}$$