1		Mathematica file
This section deals with calculation of force acting on spheroid when kept inside the magnetic field in different configurations. This section deals with configuration of applied magnetic field where it is displaced only in z direction. There acting on a spheroid kept inside a magnetic field can be evaluated using maxwell stress Tensor. Normal vector calculation > (Epherical co-ordinates) This calculation is shown in detail in Section B(b) or insernal vector to surface of Spheroid inb? normally = (R-Rs cos (20)) Sino, -4Rs cos d sino (R-Rs cos (20)).0) L refuneed from eqn. 12b. now, we convert this normal vector in from spheroid co-ordinates. This is achieved by multiplying it with transformation matrix. SphTo Car Ms = (Sino cos q cos o cos q — Sin q cos q — De cos o — Sin o 0		Euction E (e) Force displacement DATE: //
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- now, we convert this normal vector in from spherical co-ordinates to cartesian co-ordinates. This is achieved by multiplying it with transformation matrix. SphTo Car Ms-c = (Sind cooq cood cooq - Sing) Sind sing cood sing coop - De cood - Sind 0		
- now, we convert this normal vector in from spherical co-ordinates to cartesian co-ordinates. This is acheived by multiplying it with transformation matrix. SphTo Car Ms-oc = (sino coo \text{coo} coo	norma	$= (R-Rs cos (20))^2 sin \theta, -4Rs cos d sin \theta (R-Rs cos (20)), 0)$
Sph To Care Ms-oc = (Sin O coo φ coo φ coo φ - Sin φ) coo φ coo φ coo φ coo φ - Sin φ coo φ - Sin Q coo φ coo φ - Sin Q o		L'refuenced from egn. 126 De
Sph To Care Ms-oc = (Sin O coo φ coo φ coo φ - Sin φ) coo φ coo φ coo φ coo φ - Sin φ coo φ - Sin Q coo φ coo φ - Sin Q o		spherical co-ordinates to cartesian co-ordinates. This is acheived by multiplying it with transformation matrix.
115-9C - Sino sino coso sino coso - De coso - Sino 0		
		115-00 - sing sing coop - De
		V '

2. 4

	n's - normal in cartesian coordinates PAGE NO.:
A	mc = Ms-c · m
nx	ne = (R-2Rs-3Rs cos (20)) (R-Rs cos (20)) cosquiro
Iny	nc = (R-2Rs-3Rs Con (20)) (R-Rs Con (20)) sin's sin \ 3
mz	në = coop (R+2Rs-3Rs coo (20)) (R-Rs coo (20)) sino
	Area element of Spheroid
Al series	dAi = ni ds — De where ni = unit normal vector in its direction
	ds = n dodg - differential area element for Be any surface.
	dAi = ni IInlI dodp = nidodp - @e IInlI
Ay Ay Az	$dA_{x} = n_{x}d\theta d\phi$ $dA_{y} = n_{y}d\theta d\phi$ $dA_{z} = n_{z}d\theta d\phi$ $dA_{z} = n_{z}d\theta d\phi$
	Hence, initially we used a normal vector rather than a unit Inormal vector.

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	Magnetic field at the surface of Spheroid -
	Bout (8,0,9) r= r(0) calculated in eq 42 d is used directly over here.
307	8 e (0 0) - 8 ··· (0 0) - (8) e
Bout Spl	word for the point (0, 0, 4) (5=0(0)
	Bout sury $(0,0) = Baut(0,0,0) _{v=v(0)} - 6e$ uroid Converting the magnetic field at the surface of spheroid in cartesian coordinates.
	Using the matrix defined in eq. 2e, it can be converted easily
	Bout, cout, sury (0,q) = Ms-c · Bout, sury (0,q) — (9)e
	Boutlart
	Now, we define
Bout 2	Bout, cart, surf, sq (0, 9) = (Bout, cart, surf (0, 9)) - (De
By Bz	$B_x = B_{out}$, care, surf $(0, \varphi)$. $B_y = B_{out}$, care, surf $(0, \varphi)$ \ $-(1)e$ $B_z = B_{out}$, care, surf $(0, \varphi)$

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$$f = \int \nabla \cdot \vec{T} \, dV \qquad \qquad \text{(2)} e$$

$$= \oint \vec{T} \cdot \vec{n} \, dS = \oint \vec{T} \cdot \vec{n} \, d\theta \, d\phi \qquad \qquad \text{(3)} e$$

$$Tij = \int_{P_0} \left(B_1 B_j - [Sij B^2] \right) + \int_{P_0} \left(E_1 E_j - [Sij E^2] \right) - \text{(Me}$$

$$Since, \text{ those ise no electric field}$$

$$Tij = \int_{P_0} \left(B_1 B_j - [Sij B^2] \right) - \left([Se] e$$

$$Txx = \int_{P_0} \left(B_2 - [3e] \right) = \int_{P_0} \left(B_1 B_2 - [3e] \right) - \left([Se] e$$

$$Txx = \int_{P_0} \left(B_2 B_2 - [3e] \right) = \int_{P_0} \left(B_1 B_2 - [3e] \right) - \left([Se] e$$

$$Txz = \int_{P_0} \left(B_1 B_2 - [3e] \right) - \left([Se] e$$

$$fx = \int_{P_0} T_{MX} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MZ} \, dA_2 - ([3e] e$$

$$= \int_{P_0} T_{MX} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 - ([3e] e$$

$$= \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 - ([3e] e$$

$$= \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 - ([3e] e$$

$$= \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 - ([3e] e$$

$$= \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 - ([3e] e$$

$$= \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0} T_{MY} \, dA_1 + \int_{P_0} T_{MY} \, dA_2 + \int_{P_0}$$

F = (fx, fy, fz) - 22e

fz = \$ Tzz nzdodq + \$ Tzy dodq ny + \$ Tzx dodq nx (fz) (fz) (fz) (fz)

THE STATE