CASEH: (EXTRA ROD MASS WITH FUDGE FACTOR)

PEO = KE+PE, PEO = (MCYL+ MTA + MEXT) gho-MO

PE, = MEXT 9 h.

KE = = (Maye + MTA) V2 + 2 I EXT W2 + 2 I C + 2 I EXT W2

V= Rw

 $= \frac{1}{2} \left( M_{CYL+} M_{TA} \right) R^2 \omega^2 + \frac{1}{2} M_{EXT} \left[ (R + r \cos \theta)^2 + (r \sin \theta)^2 \right] + \frac{1}{2} T_{ext}$   $+ \frac{1}{2} \left( \frac{1}{2} M_{EXT} R_{EXT}^2 \right) \omega^2$ 

= W2[2([MC41+Mta]R2+MEXT[R2+2RTCOSO+12]+Ic+2MEXTREXT)]

PES=KE,+PE,

PE-PE = KE :

(MCYL+MTA+MEXT)gho-MO-MEXTgh, =  $\omega^2 \left[ \frac{1}{2} \left( \left[ M_{CYL} + M_{TA} \right] \right) R^2 + M_{EXT} \left[ R_+^2 2 R_T \cos \Theta_+ r^2 \right] + I_C + \frac{1}{2} M_{EXT} R_{EXT}^2 \right] \right]$ 

 $\omega^{2} = 2 \left[ \left( M_{\text{CYL}} + M_{\text{TR}} + M_{\text{ENT}} \right) g h_{o} - M \theta - M_{\text{ENT}} g h_{i} \right]$   $+ M_{\text{ENT}} \left[ M_{\text{CYL}} + M_{\text{TR}} \right] R^{2} + M_{\text{ENT}} \left[ R^{2} + 2 R_{r} \cos \theta + \Gamma^{2} \right] + I_{c} + \frac{1}{2} M_{\text{ENT}} R_{\text{ENT}}^{2}$   $+ M_{\text{ENT}} \left[ R^{2} + 2 R_{r} \cos \theta + \Gamma^{2} \right] + I_{c} + \frac{1}{2} M_{\text{ENT}} R_{\text{ENT}}^{2}$   $+ M_{\text{ENT}} \left[ R^{2} + 2 R_{r} \cos \theta + \Gamma^{2} \right] + I_{c} + \frac{1}{2} M_{\text{ENT}} R_{\text{ENT}}^{2}$ 

 $\omega = \int 2[(M_{\text{CYL}} + M_{\text{TM}} + M_{\text{EXT}})_{q} R\Theta_{\text{SSN}}B - M\Theta - M_{\text{EXT}}gr[cos(\Theta+B) - cos(B)]^{2}$   $\sqrt{[M_{\text{CYL}} + M_{\text{TM}}]R^{2} + M_{\text{EXT}}[R^{2} + 2R_{\text{r}}\cos\Theta + r^{2}] + I_{c} + \frac{1}{2}M_{\text{EXT}}R_{\text{EXT}}^{2}}$