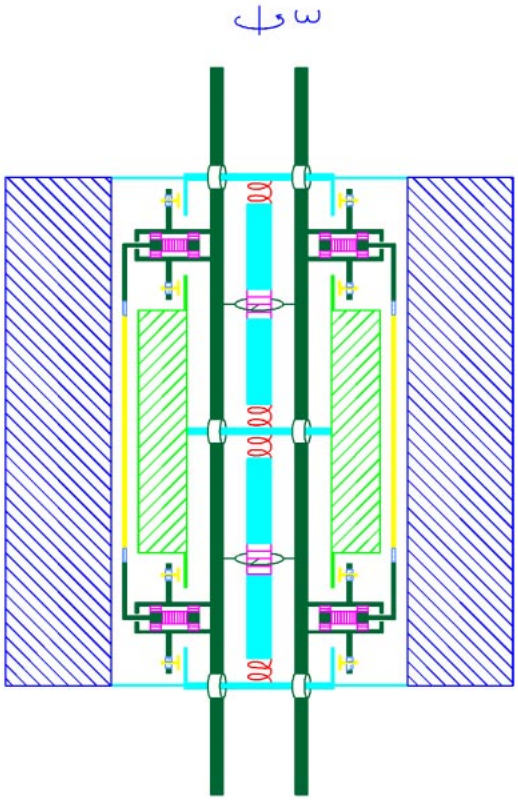
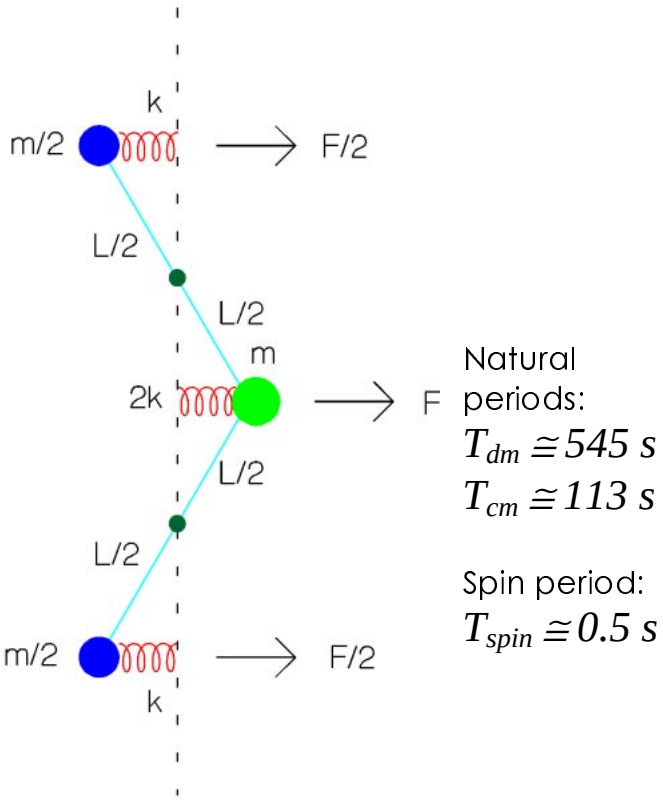
Why the GG Design? Novelties and Advantages (II)

Weakly Coupled, Fast Spinning Test Cylinders





Natural periods:

$T_{dm} \cong 545\ s$

$T_{cm} \cong 113\ s$

Spin period:

$T_{spin} \cong 0.5\ s$

- Null experiment: no differential force ⇒ no effect (almost…). It must be well balanced (CMR); similar to an ordinary balance (with vertical beam); use piezo actuators (very reliable); easy at $\cong 0\text{-}g$

  Largest effect to balance out is air drag ($\cong 10^{-12}\ g$ after drag compensation by FEEP mini-thrusters); it is variable and at ≅ 90° from signal ⇒ signal not balanced out

  CMR required: 1/100,000; achieved 1/200,000.

- Mechanical coupling very weak (thanks to weightlessness) natural periods long ⇒ system sensitive to small differential forces (small forces produce displacements which can be detected once transformed into electric signals)

- Spin frequency much higher than natural frequencies (supercritical rotation): almost ideal, unconstrained rotors. They are known to self-center very precisely (by laws of physics) ⇒ smooth rotation (no wobble); classical differential effects due to non-zero separation largely reduced