74(6): Summary of Concepts in Paper 74

When the magnet is stationary there is no spacetime torque. In form notation:

$$T = d \wedge q + \omega \wedge q = 0 \quad -(1)$$

and

$$d \wedge q = - \omega \wedge q. \quad -(2)$$

With rotational symmetry this becomes (vector notation)

$$(\nabla^2 + \kappa^2)\, \underline{q} = \underline{0} \quad -(3)$$

This is the balance condition where the torque on the magnet is zero. This can be considered to be the condition of spacetime in the absence of the magnetic assembly. The latter introduces a driving term, so eq. (3) becomes:

$$\boxed{(\nabla^2 + \kappa^2)\, \underline{q} = \underline{R} \cos(\underline{\kappa_0} \cdot \underline{r})} \quad -(4)$$

In the Z axis:

$$(\nabla^2 + \kappa^2)\, q_Z = R \cos(\kappa_0 Z) \quad -(5)$$

Here R has the units of inverse square metres. The solution of eq. (5) is:

$$\boxed{q_Z = \frac{R \cos(\kappa_0 Z)}{\kappa_0^2 - \kappa^2}} \quad -(6)$$

This produces the potential:

$$A_Z = A^{(0)} q_Z \quad -(7)$$

and the torque:

$$\boxed{\underline{Tq} = - \underline{m} \times \underline{B}_Z} \quad -(8)$$

where $\underline{m}$ is the magnetic dipole moment of the magnetic assembly, $\underline{B}_Z$ is from space-time.