

In the former case, equilibrium is not possible; in the latter, equilibrium will subsist if the Resultant either be zero or pass through the fixed point, and each of these suppositions will make its moment about this point vanish, and therefore also the algebraic sum of the moments of all the Forces, to which sum it has been shown to be equal.

Hence the necessary and sufficient condition of equilibrium is, that

*The sum of
the moments
must vanish.*

The algebraic sum of the moments of all the Forces about the fixed point must vanish.

This principle will always be quoted by the name of "the vanishing of moments."

89. The same principle may easily be seen to apply when the rigid body is capable of turning about a fixed straight line or axis, and the forces are not all in one plane but are perpendicular to this axis. The moment of each Force being taken about that point of the axis which is cut by a perpendicular plane containing the Force, we can state the condition of equilibrium in the form:

The algebraic sum of the moments of the Forces about the fixed axis must vanish.