‘conservation 守恆

‘angular mo’mentum 角動量

‘linear mo’mentum 線動量

‘isolated 孤立的、隔離的

ex’ternal force 外力

a’nalogous 類似的;可比擬的

conser’vation law 守恆律、守恆定律

‘torque [tɔ:k] 力矩; 項鍊,手鐲

Conservation of angular momentum

In Chapter 9, we found that the total linear momentum of a system of particles remains constant if the system is isolated, that is, if the net external force acting on the system is zero. We have an analogous conservation law in rotational motion:

> The total angular momentum of a system is constant in both magnitude and direction if the net external torque acting on the system is zero, that is, if the system is isolated.

‘principle 原理

‘basis 基礎,根據;準則、基底（數）

‘version 版本 DJ: [\`və:ʃən]，KK: [\`vɝʒən]

‘isolated system 孤立系統

‘model 模型

‘indicate 指出

con’sist of 由..組成/構成

‘index 標誌;符號,索引

This statement is often called[2] the principle of **conservation of angular momentum** and is the basis of the **angular momentum version of the isolated system model.** This principle follows directly from Equation 11.13, which indicates that if

$$\sum \vec{\boldsymbol{\tau}}_{\text{ext}} = \frac{d\vec{\mathbf{L}}_{\text{tot}}}{dt} = 0 \qquad \textbf{(11.17)}$$

then

$$\boxed{\vec{\mathbf{L}}_{\text{tot}} = \text{constant} \quad \text{or} \quad \vec{\mathbf{L}}_i = \vec{\mathbf{L}}_f} \qquad \textbf{(11.18)}$$

For an isolated system consisting of a number of particles, we write this conservation law as $\vec{\mathbf{L}}_{\text{tot}} = \sum \vec{\mathbf{L}}_n =$ constant, where the index n denotes the nth particle in the system.

‘isolated ro’tating system 孤立的轉動系統

de’form 使變形、變形， de’formable 可變形的

‘undergo 經歷;經受;忍受,接受(治療,檢查等)

distri’bution 分佈;分發;分配; redistri’bution 重新分配;再分配

in some way 以某種方式

‘product 乘積，產品，成果

‘therefore 因此;因而;所以

re’quire 要求、需要

If an isolated rotating system is deformable so that its mass undergoes redistribution in some way, the system’s moment of inertia changes. Because the magnitude of the angular momentum of the system is $L = I\omega$ (Eq. 11.14), conservation of angular momentum requires that the product of I and ω must remain constant. Therefore, a change in I for an isolated system requires a change in ω. In this case, we can express the principle of conservation of angular momentum as

$$I_i\omega_i = I_f\omega_f = \text{constant} \qquad \textbf{(11.19)}$$