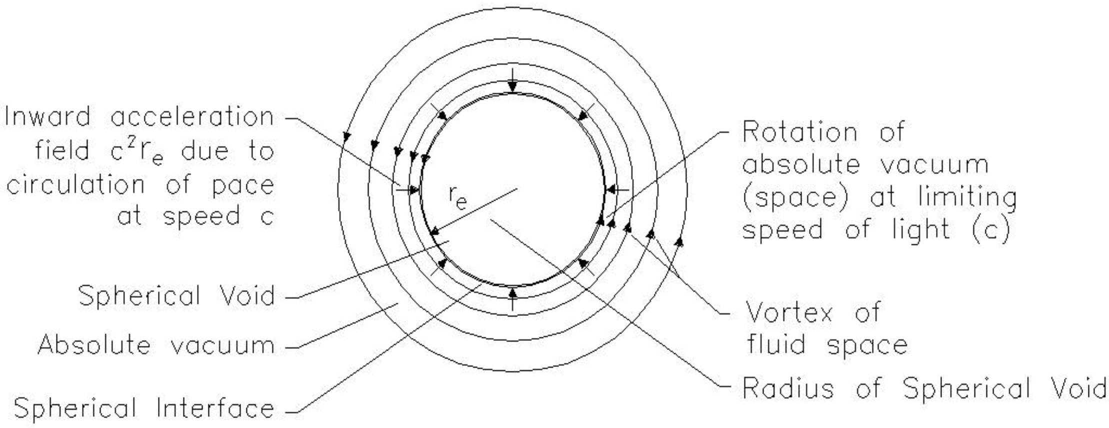
Explaining Momentum, Kinetic Energy and Inertia through the PRINCIPLES of Space Vortex Theory (SVT)

Consider motion of the *spherical interface* of the electron relative to the fluid-space medium concerning here the vacuum region in the immediate vicinity of the interface; The space-less void within the interface, during motion, leaves a cavity trailing behind it (Fig.3.2b).



Absolute vacuum possesses non-material properties of incompressibility, zero-viscosity, continuity & mass-lessness of an ideal fluid; fieldless & energyless spherical-void is created due to limiting rotation & breakdown of absolute vacuum.

Fig. 2-3 Vortex in electron structure

The displaced fluid-space (vacuum), ahead of the moving-interface, circulates back to fill the cavity, similar to what can be expected in the event of a

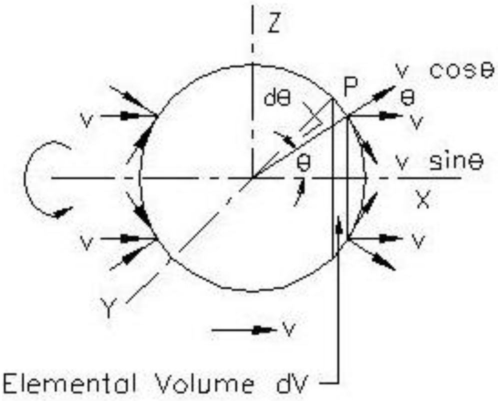


Fig. 3-2a

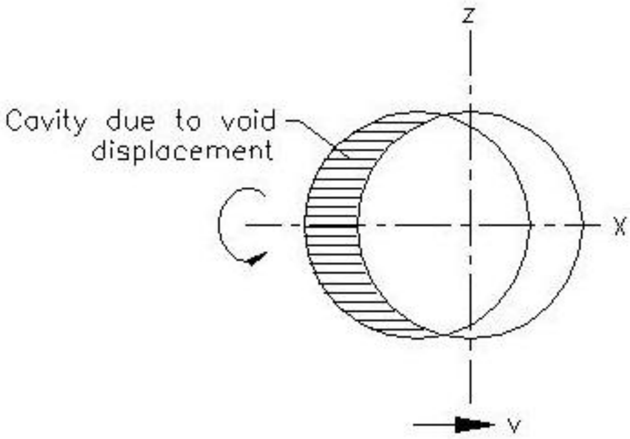


Fig. 3-2b

uniform motion of a spherical body in an ideal fluid (Fig. 3.2c). The circuitous motion of the fluid-space Fig, 3- 2d creates inward acceleration field on the front half of the interface as a reaction from space. The work done in overcoming this reaction creates velocity fields that carry the interface continuously forward due to zero viscosity of space (vacuum). (For detailed analysis refer to the author's book, "Universal Principles of Space and Matter — A Call For Conceptual Reorientation" at www.tewari.org)

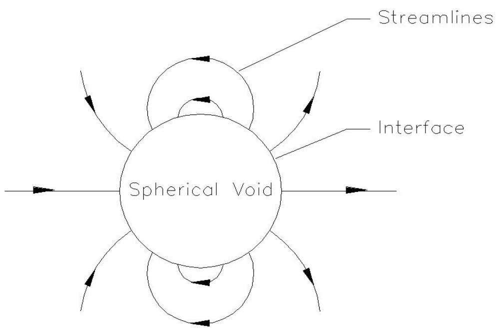


Fig. 3-2c

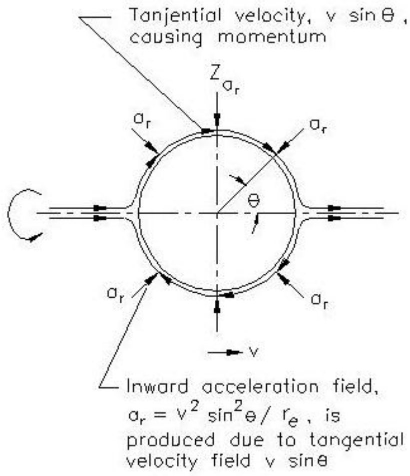


Fig. 3-2d

The interface is moving relative to space (Fig.3.2a) at uniform speed v displacing the fluid space. A point P at the interface displaces space horizontally at velocity v, which has two components, radial and tangential, as shown. While the radial velocity components at the front of the interface indicate the outflow velocity of space[1], similar velocity components at the rear are due to the inflow of the fluid space into the cavity left behind due to the interface motion (3.2b). Therefore, as regards the contribution to the work done in moving the interface, the rear radial velocity field cancels the work done by the front radial field. The tangential velocity component, $v \sin\theta$, at each interface point, however, remains as the resultant velocity field.

In Fig.3.2a, an infinitesimal element of the interface of void-volume, $dV = (\pi r_e^2 \sin^2\theta)\, r_e\, d\theta$, displaces space at velocity, $v \sin\theta$, as shown above. From mass-equation (2.6) the mass of this element

$dm = dV\, c = (\pi r_e^3 \sin^2\theta\, d\theta)\, c$; the momentum is defined as

$$dp = dm\,(v \sin\theta) = c\, v\, \pi\, r_e^3 \sin^3\theta\, d\theta.$$

Integrating over the whole interface for the momentum,

$$p = \int_0^\pi c\, v\, \pi\, r_e^3 \sin^3\theta\, d\theta = [4\pi / 3.\ r_e^3\, c]\, v.$$

Substituting the quantity in the bracket by m_e from mass-equation (2.6)

$$P = m_e\, v. \qquad (3.3.1)$$

It is seen that the classical equation for the momentum of a moving body is derived by the velocity fields in the vacuum exterior to the interface of the electron. A moving body will have no momentum Is the space is empty. This is against the Newtonian and Einstein's space.

This expression for momentum comes out to be the same as in classical mechanics; it, however, gets clear that *if the electron does not have the central void, it will neither have mass nor momentum*.

The tangential velocity, $v \sin\theta$, produces at each point on the interface (Fig. 3.2d), an inward radial acceleration, $a_r = v^2 \sin^2\theta / r_e$, against which, at the front-half of the interface, the space is displaced. Considerations will show that a linear displacement of the interface up to a length, r_e, sets the volume of space equal to its void-volume in motion at velocity v, whereas, only *half of this volume* flows out against a_r. As calculated above, consider the element of volume dV, with mass, $dm = (\pi r_e^3 \sin^2\theta\, d\theta)\, c$. The work done in displacing space of volume dV and equivalent mass dm, against the acceleration field a_r, up to a length r_e (linear motion of the interface) is defined as kinetic energy

$$dE = dm\ a_r\ r_e.$$

Integrated over half the surface of the interface

$$E = \int_0^{\pi/2} c(\pi r_e^3 \sin^2\theta d\theta)(v^2 \sin^2\theta / r_e)\ r_e$$

$$= (9\pi/64)[4\pi/3.r_e^3\ c]\ v^2.$$

Replacing the quantity in the bracket by m_e from mass-equation (2.6)

$$E = (9\pi/64)\ m_e\ v^2 \approx (1/2)\ m_e\ v^2, \qquad (3.3.2)$$

which is close to the expression for the kinetic energy in classical mechanics. **The kinetic energy is due to: (a)** ***motion of a body relative to the fluid space (VACUUM;*** **and (b)** ***production and association of velocity field*** **with a moving body**; kinetic energy is the *most basic state* of energy, which is *independent* of the structural energy. The velocity field can have any value varying from zero to the speed of light, whereas, in material structure, the maximum circulation of space must necessarily reach c and remain constant.

The principle of inertia points towards the property of non-viscosity of space, as well as void-content in matter. The acceleration field in the structure of the electron, and also the gravity field (discussed further) are *inward* fields that keep the electron held in position with "pressure"[2] from space. A body displaced from rest acquires velocity field and momentum (3.3.1); on collision with other bodies the momentum is transferred as per the existing principle of classical mechanics. Further, an electron in motion cannot acquire velocity field if it is a *point mass,* because a *dimension-less* point can have no energy; energy requires certain zone, howsoever small, for its distribution. Neither, a point-mass can possess momentum and kinetic energy. It is the *spherical interface* of electron at the vortex center that, combined with the non-viscous space, exhibits the mechanical as well as the electrical properties including inertia.

[1] Space means Vacuum

[2] The word "pressure" is used in material media like hydrostatic pressure on the surface of a body. The force-effect of the inward fields on the electron interface will need coining of another expression.