

The Coriolis Force and the Screw

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Abstract. The screw effect was known to the ancients. It employs the principle that a surface reaction at an angle can make an applied force undergo a right angle turn. The screw is a helix, and wherever we see a perpendicular swivel in conjunction with a helix, we must suspect the hidden hand of the Coriolis force to be operating behind the scenes.

The Inclined Plane and the Screw

I. In applied mathematics and physics, normal reaction from a surface is a quantity which is normally denoted by the capital letter N. Apart from that, not much more is known about it. The microscopic details of how it works have never been investigated since modern physics ended with the Bohr model of the atom. In the simple case of a horizontal surface, it can be assumed that the normal reaction is a reactive repulsive force that is rooted in the inter-atomic bonds. It could be a G2 centrifugal repulsion acting between atomic orbitals or it could be a G5 aether pressure force.

If however we incline the surface at an angle, the situation becomes more interesting. The normal reaction results in a horizontal force in addition to the vertical reaction force. It doesn't matter whether the applied force is gravitational or contact pressure. This is the principle that occurs in the screw. With a screw, we apply a force in one direction and we obtain a resulting motion at right angles to the applied force. This right angle turn is caused by events which are going on at nanoscopic level in the atoms and molecules of the materials at the contact point.

The Rattleback

II. In 'Fundamental Torque and the Rattleback' at,

<http://www.wbabin.net/science/tombe37.pdf>

it was discussed how the reversal torque in a rattleback was caused by a hybrid of the centrifugal force (G2) and the Coriolis force (G3). At the time of writing, it was assumed that centrifugal force and Coriolis force were two mutually perpendicular aspects of the same thing, and that since the reversal torque bore seemingly irreconcilable characteristics of both centrifugal force and Coriolis force, that it was therefore some kind of hybrid force that occurs within the complexity of rigid bodies.

The case for arguing that centrifugal force and Coriolis force are two mutually perpendicular aspects of the same thing vanishes when we consider the underlying physical cause of these two forces. Although they can both be expressed by the same mathematical formula $\mathbf{v} \times \boldsymbol{\omega}$, the physical explanations diverge. The Coriolis force is the deflection effect that occurs when a particle moves in a vortex of vorticity $\boldsymbol{\omega}$, whereas the centrifugal force is the outward repulsion that occurs when tangential motion causes a vortex which in turn congests the gravity sink and causes a back-feed of gravity pressure. Both of these two forces will act perpendicularly on a motion such as to change the direction of the motion, and they will both be mutually perpendicular to each other when described in polar coordinates in cases in which space/aether behaves as if it is a rigid solid [1]. But the centrifugal force is a pressure force that does work and which has an associated potential energy in the form of aether pressure. This centrifugal aether pressure can be observed in a rotating bucket of water that is rotating relative to the background stars. Coriolis force on the other hand is merely the deflection of the inertial path that occurs in a vortex. If the inertial path in an irrotational region of aether happens to be a straight line, then under the same conditions, this inertial path would curve if vorticity or rotation were to be introduced into the aether/space.

In the rattleback, it is almost certainly the G2 centrifugal torque caused by asymmetry that brings about the initial retardation while the rattleback is rotating in the horizontal plane. However, this then opens up the question as to where the centrifugal potential energy will be stored, and it seems that it is not stored at all but immediately converted perpendicularly into an up and down oscillation. This right angle

conversion has got all the hall marks of the G3 Coriolis force in action at nanoscopic level inside the material of the rattleback. It seems that when the G2 force is induced, that this causes a centrifugal pressure in the material which is immediately released sideways. This principle would appear to be identical to that which is occurring in screws and on inclined planes.

The Coriolis Force

III. Coriolis force (G3) is a convective force that only acts when motion is already present. However, in the case of gravity acting downhill on an inclined plane we don't need to have any motion to start the ball rolling. The effect can begin from a state of rest, at least as far as the large scale is concerned.

So where is the motion that induces the Coriolis force that in turn induces a horizontal motion out of the vertically downward gravitational force? This motion must clearly be occurring at the atomic level on the nanoscopic scale. We cannot see exactly what is happening on the nanoscopic level. But we can be sure that the situation is anything but static and that the pressure induced on the inclined surface due to the weight of the object, induces a nanoscopic scale Coriolis force just like in the case of the rattleback.

Conventional wisdom teaches us that the horizontal component of the acceleration that is acting on a body that is moving down an inclined plane comes from gravity itself, in that any force can be mathematically resolved into two mutually perpendicular components. The conventional theory is that the normal reaction N cancels out one of these two components, hence leaving only the component that acts in the direction down the inclined plane. There is however no physical basis to account for a gravitational component in the horizontal direction. The horizontal component has to come from the surface reaction. The atoms and molecules in the material at the surface must be effecting a repulsive force vertically upwards which in turn triggers off a Coriolis force that can deflect a downward motion sideways.

Inertial Mass

IV. This brings us to the issue of whether or not the acceleration associated with the Coriolis force is inertial mass dependent. We know that gravitational acceleration is inertial mass independent. Galileo demonstrated this at Pisa. Galileo also noted that the force acting down an inclined plane is also inertial mass independent.

If the horizontal component of the acceleration down an inclined plane is indeed being caused by a Coriolis force on the nanoscopic scale at the contact surface, this means that this particular Coriolis force is causing acceleration that is inertial mass independent. This would follow from the fact that Coriolis force does not involve any potential energy and hence it does not involve any accumulation of aether pressure as would be the case with parallel reaction forces. The Coriolis force that acts at the contact surface on the nanoscopic scale between the atoms and molecules of the materials must be transmitted throughout the entire rigid body without any absorption of aether pressure whatsoever. Inertial mass is an impedance which occurs due to the absorption of aether pressure when an external force is applied to a body. Coriolis force does not result in any accumulation of aether pressure. It is a force which only changes the direction of an object. The absence of an aether pressure in conjunction with the Coriolis force might account for the breakdown in Newton's third law of motion which is sometimes reported when Coriolis swivels are occurring. Newton's third law may only be applicable to forces that involve aether pressure or aether tension.

In the case of the magnetic Coriolis force $\mathbf{v} \times \mathbf{H}$ which appears in the Lorentz force, the inertial mass dependence of the ensuing acceleration, that can be observed in mass spectrometry, must be attributed to the fact that this Coriolis force is acting on the picoscopic scale in the electric sea and that the effects are being transmitted to the nanoscopic scale at the atomic level through tension and pressure forces such as G1, G2 and G5. For more information on the 'G' codes see 'Fundamental Torque and the Rattleback' at,

<http://www.wbabin.net/science/tombe37.pdf>

References

[1] When space/aether behaves like a rigid solid as is the case in large scale constrained radial motions, the Coriolis force becomes $2\mathbf{v}\times\boldsymbol{\omega}$.