Isaac Newton's falsely dismissed theory of inertially caused pressure resistance
Newton's theory vs. d'Alembert's paradox, each correct within differing conditions not knowable in the 18th century.

Preprint version 2, https://b2streamlines.com/Preprints/20200825Newton.pdf

Philip Randolph Patten, Isaac Newton

amphioxus.philip@gmail.com

Abstract:

In his *Principia (*1687, 1713, 1726), Isaac Newton asserted his theory of inertially-caused non-viscous (frictionless) pressure resistance (drag) within hypothetical inviscid (frictionless) fluids and as a component of drag within real fluids. Within two decades of Newton's 1727 death, under only apparently similar inviscid conditions, Jean le Rond d'Alembert mathematically proved zero drag around fore-aft symmetrical objects in flow, the opposite of Newton's drag assertion. Within limited 18th-century understandings of fluids, when it wasn't ignored, it appeared that Newton's theory had been disproved. But each theory is correct within differing conditions that couldn't be described until the late 19th century. That analysis was never made. The archaic reasoning of Newton's theory's disproof has persisted to the present. Historically it became a conflict between d'Alembert's assumption of fore-aft flow symmetry under inviscid 'steady' flow conditions he assumed were real but were later shown to be useful fictions, vs. Newton's theory of inertial fore-aft pressure differences and his assertion that drag makes a momentum exchange between projectile and flow, slowing a projectile and adding "motion" to wake. Newton didn't explicitly label these fore-aft differences of pressure and momentum as asymmetries. Newton focused on the fact of momentum exchange rather than what it does to wakes. He didn't get to the idea that drag-added momentum would make wake flows develop the flow patterns, eddies, and turbulence that in turn would be the mechanisms of his inertial pressure drag. Such disturbances soak up kinetic energy that is then unavailable to be converted into pressure recovery aft, making Newton's unequal pressures fore and aft – drag. In 1842 Sir George Gabriel Stokes shifted the focus of fluid dynamics to fluid instabilities. The drag effects of flow separations, instabilities, and turbulence followed. They show Newton's theory as correct, or should have.