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Fluid Mechanics Applications

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Editorial

Fluid mechanics is the study of fluid behavior (liquids, gases, blood, and plasmas) at rest and in motion. Fluid mechanics has a wide range of applications in mechanical and chemical engineering, in biological systems, and in astrophysics. There is a fluid flow connected with all moving bodies, whether they are pushing against a solid surface (automobiles, trucks, trains, bikers, cheetahs) or the surrounding medium (airplanes, birds, frisbees, ships, submarines, dolphins, fish). In a moving fluid, the body may be at rest (mountains, islands, skyscrapers, ocean platforms, flagpoles, bridge towers, pylons, trees, mussels). Internal fluid motion involving transport processes is possible (internal combustion engines, cooling and ventilation systems, flows in the blood vessels and lungs). The scales might be very huge (planetary scale motions — atmospheric and ocean circulation on Earth, galactic turbulence) or very small (microscale motions) (circulation and transport in micromachines, bubble and particle motions). A wide variety of scales spanning many orders is used in many practical applications.

Fluid mechanics is a discipline of physics that studies fluids (liquids, gases, and plasmas), as well as the forces that act on them. Fluid statics, or the study of fluids at rest, and fluid dynamics, or the study of the effect of forces on fluid motion, are the two branches of fluid mechanics. It is a branch of continuum mechanics that models matter without taking into account the fact that it is made up of atoms, that is, it models matter from a macroscopic rather than microscopic perspective. Fluid mechanics, particularly fluid dynamics, is a burgeoning field of study with numerous unsolved or partially solved issues. Fluid mechanics is a mathematically challenging subject that is best tackled using numerical methods, most commonly computers.

Fluid dynamics is a branch of fluid mechanics that studies the flow of fluids in motion. In the generally recognised fluid mechanics, there are various fields of fluid dynamics, aerodynamics, and hydrodynamics. Calculating force and moments, measuring the mass flow rate of oil through pipelines, anticipating weather patterns, analysing interstellar nebulae, and modelling are all examples of this. Fluid dynamics is studied by scientists from several fields. Planetary evolution, ocean tides, weather patterns, plate tectonics, and blood circulation are all studied using fluid dynamics. Rocket engines, wind turbines, oil pipelines, and air conditioning systems are just a few of the key technological uses of fluid dynamics.

Fluid mechanics is a dynamic research field in science and engineering, with many unsolved or partially solved problems. Fluid dynamics is a mathematically challenging subject. Numerical approaches, usually involving computers, are sometimes the best way to tackle problems. Fluid mechanics is a subject that is particularly amenable to cross-fertilization with other sciences and engineering disciplines since fluids have the potential to transfer matter and its properties as well as transmit force. Fluid mechanics is important in many fields of engineering, including mechanical, chemical, petrochemical, civil, metallurgical, biological, and ecological. The continuity assumption is an idealisation of continuum mechanics that allows fluids to be viewed as continuous even if they are made up of molecules on a tiny scale. Fluid statics or hydrostatics is the branch of fluid mechanics that studies fluids at rest. It embraces the study of the conditions under which fluids are at rest in stable equilibrium; and is contrasted with fluid dynamics, the study of fluids in motion. Hydrostatics offers physical explanations for many phenomena of everyday life, such as why atmospheric pressure changes with altitude, why wood and oil float on water, and why the surface of water is always level whatever the shape of its container [1-5].

Conflict of Interest

None.

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