

THE THEORY OF THE EQUILIBRIUM AND MOTION OF FLUIDS

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The theory of the equilibrium and motion of fluids by Thomas Webster

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THOMAS WEBSTER

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EQUILIBRIUM AND
MOTION OF FLUIDS**

Phys.
Mech.
W.

THE THEORY
OF THE
EQUILIBRIUM AND MOTION
OF
FLUIDS.

By THOMAS WEBSTER, M.A.
OF TRINITY COLLEGE.

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P R E F A C E.

IN the "Principles of Hydrostatics," published a few months ago, I dwelt in detail on the phenomena which occur in considering the mechanical properties of fluids, and on the principles to which they lead, and I illustrated those principles by their applications in various machines. In the present treatise, which may be considered as a mathematical supplement to the former, taking these principles as established, I have endeavoured to develop them by the application of the Calculus. The two will, I hope, be found to contain the inductive and deductive reasoning which belongs to that department of natural philosophy of which they profess to treat.

The present treatise is compiled principally from the writings of Poisson and Challis, the well-known work of the former having furnished most of the propositions in the equilibrium, as the various papers of the latter have done those in the motion, of fluids; and I have endeavoured to bring before the student what has hitherto been done in this department of science, and to point out the difficulties which present themselves to its further progress. These difficulties are purely mathematical, and I venture to hope, that when it is fully understood that this science and that of Light are at a stand because of the imperfect state of our analysis,

some vigorous efforts will be made by those who have time and talents for this pursuit, to remove this barrier, and to place these sciences in the same rank, as inductive and deductive sciences, with that of Gravitation. Much has been done in the last few years, much is almost within our grasp, but much still remains to be done.

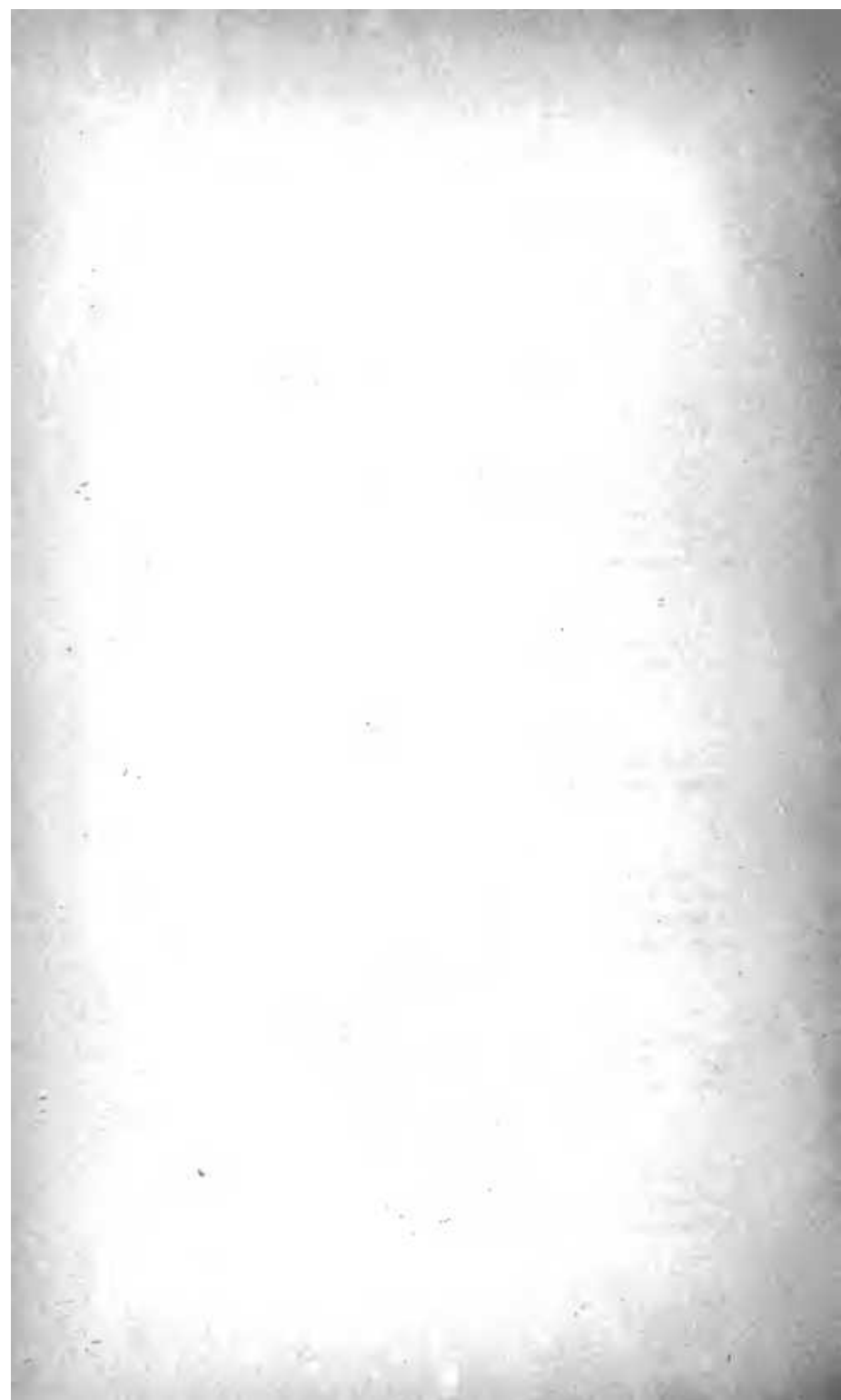
The importance of the theory of fluid motion in the present state of science is very great; for the physical and mathematical phenomena of this department present many suggestions in the theories of Light and Heat: thus the way in which the crests of one set of waves in water may be superposed over the hollows of another, producing a level instead of an undulated surface, is strikingly analogous to the interference of the vibrations of two musical strings producing a momentary silence, of two waves of light producing absolute darkness; a complete theory of the one may be the means of leading to a complete theory of the others, and all will advance contemporaneously.

The obligations of this treatise to the published papers of Professor Challis are, as I have stated, considerable; but I am also deeply indebted to him for the assistance which he has afforded me on every occasion of difficulty throughout this work. When I commenced it, many points appeared to me involved in difficulty, and incapable of being explained in an elementary and distinct manner; the reverse is now however the case, as I hope the following pages, and especially Capillary Attraction, (which subject I had considered as hopeless, until he furnished me with the very simple and elementary propositions here given), will testify.

Notwithstanding that great care has been bestowed on the correction of the press, I can hardly hope that the errata will be either few or trivial; and as an author is generally the last person to detect them, I should be extremely obliged to any one who would forward to me or to the Publisher any which he may discover.

T. W.

TRINITY COLLEGE,
February 1836.



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