



# The Dynamics of Flight, The Equations (Vol 1)

*Jean-Luc Boiffier, Onera-Cert (Centre d'Etudes et de Recherche de Toulouse)*

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The Dynamics of Flight The Equations Jean-Luc Boiffier SUPAÉRO and ONERA - CERT, France The study of aircraft flight is based upon the model formed by the flight dynamics equations, which are comprehensively evolved in this book. These equations and the associated hypotheses are the fundamental prerequisite of every study of flight dynamics. In this work, the equations are adapted to the study of the atmospheric or spatial flight of a rigid airplane, for which a series of successive simplifications are made, ranging from the flat and fixed Earth hypotheses to those of longitudinal decoupling and linearised flight. Several representations of the equations are developed with a precise formulation of the atmospheric perturbation influence (wind and turbulence). The definition of the equilibrium and pseudo-equilibrium notions is accompanied by an analytical and numerical general method for equilibrium research. Next, the linearisation and the decoupling operation, fundamental for the dynamic and analytical process of the equations, is developed. Major features include:

- \* General equations of flight dynamics with successive simplifications and in several forms (calculation details appear in the appendix)
- \* Precise formulation of atmospheric perturbation on the equations
- \* Analytical and numerical methods for equilibrium research and linearisation
- \* A compendium of rigorous definitions and notations of the numerous flight dynamics parameters
- \* Onboard measures equations
- \* Developments designed to solve practical difficulties in a thorough and simple way

With its inclusion of both the theoretical and applied aspects of flight dynamics equations, this book serves as an essential tool for engineers, researchers and students working in the fields of aeronautics: flight dynamicists, automatic control systems specialists, aerodynamicists and specialists in structures.

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