

## **Introduction to the Theory of Distributions and its applications to PDE**

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The concept of a distribution (also known as a generalized function) begins with the Dirac delta, which appeared naturally in the modeling of very basic physical situations, such as the presence of a static particle in the universe. This simple mathematical object gave rise to a very deep and rich theory in Functional Analysis and Differential Equations.

This work is divided in two blocks. At first, the student shall made an introduction to the following topics on Functional Analysis: 1. The space of distribution: examples, topology and density in the  $L^p$ -spaces. 2. Schwartz class and Fourier transform. 3. The Fundamental Solution of a Linear Differential Operator.

Once these concepts are clear, we shall focus on its applications in some classical system of differential equations, such as Poisson's equation, Hodge decomposition or Maxwell's equations.