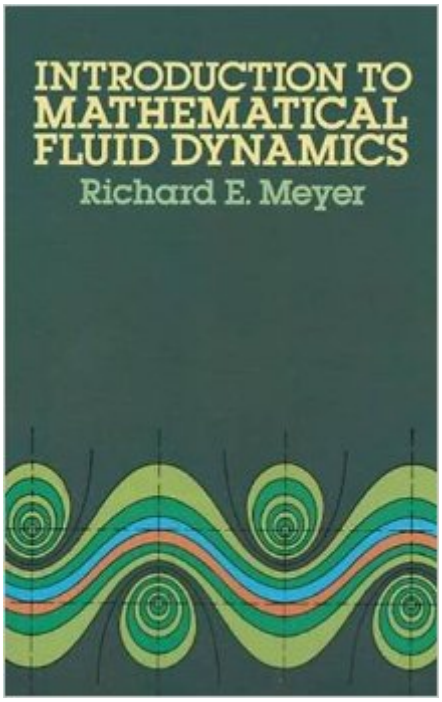
Introduction To Mathematical Fluid Dynamics (Dover Books On Physics)



Synopsis

Fluid dynamics, the behavior of liquids and gases, is a field of broad impact â ” in physics, engineering, oceanography, and meteorology for example â ” yet full understanding demands fluency in higher mathematics, the only language fluid dynamics speaks. Dr. Richard Meyer’s work is indeed introductory, while written for advanced undergraduate and graduate students in applied mathematics, engineering, and the physical sciences. A knowledge of calculus and vector analysis is presupposed.The author develops basic concepts from a semi-axiomatic foundation, noting that "for mathematics students such a treatment helps to dispel the all too common impression that the whole subject is built on a quicksand of assorted intuitions." Contents include:Kinematics: Lagrangian and Eulerian descriptions, Circulation and Vorticity.Momentum Principle and Ideal Fluid: Conservation examples, Euler equations, D’Alembert’s and Kelvin’s theorems.Newtonian Fluid: Constitutive and Kinetic theories, exact solutions.Fluids of Small Viscosity: Singular Perturbation, Boundary Layers.Some Aspects of Rotating Fluids: Rossby number, Ekman layer, Taylor-Proudman Blocking.Some Effects of Compressibility: Thermodynamics, Waves, Shock relations and structure, Navier-Stokes equations.Dr. Meyer writes, "This core of our knowledge concerns the relation between inviscid and viscous fluids, and the bulk of this book is devoted to a discussion of that relation."

Book Information

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Customer Reviews

Excellent mathematical book on fluid mechanics. Engineers and scientistis beware! Some topology

required. There will not be much physical insight on fluid mechanics in this book but the mathematics is explained in gorey detail.

Note that my training is in pure mathematics and not in engineering, so what I say has little to do with the engineering side of things. Also, I am currently reading this book during my free time. It's subject matter, personally, is really interesting to me as someone interested in analysis and who has some physics background.This book seems to be a good fit for any graduate student who is interested in analysis. The book does not pull any punches when it comes to using tools in pure mathematics, so the math is advanced enough for a graduate student to not bore them with the basics. I would say the book is probably a bit mathematically theoretical for engineering students and the like, however, unless you are willing to take some things for granted.The book doesn't spoon feed you either. You should expect to have to go line by line in some parts to really understand what's being done, which is exactly what I was looking for.So, I would say this book is great for a first year graduate student in pure mathematics who is interested in seeing a really cool side of analysis.

I bought this book because I was interested in the subject and the price was good, but as somebody who is new to the subject, I found this book very difficult to follow. The initial level of abstraction is very dense, and even after a couple of tries over the years, I've not been able to get very far.I have what I'd consider to be a decent level (engineering undergrad) of mathematics and physics preparation, but have not been able to get much use out of this text. Perhaps this book would potentially be used by somebody who already knew some fluid dynamics.

For engineering students and mathematicians, i got little out of it but that's my fault not the authors.

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