The book under review is the next:
Marian Mureşan,
Mathematica® and Differential Equations,
Amazon, USA, July, 2021, xvi+612.

Figure of the solutions to Fisher equation on the front cover of the book. This is a very short escape to *Mathematica*.

The present book is focused on finding an answer to the question: how to realize a strong link between *Mathematica* and a differential equation, ordinary or partial? This book tries to offer an answer. It is largely recognized that generally it is not easy to solve a differential equation. It is also generally admitted that only a few types of differential equations are solvable in closed-form. Sometimes even the numerical methods are rather difficult to handle. We only mention the stiffness phenomenon.

We chose *Mathematica* as the main tool in solving differential equations since it offers a lot of instruments and facilities to approach a solution answering to a differential equation with or without additional conditions.

The book is aimed at undergraduate, graduate and PhD students, researchers, and those with an interest in this topic.

This work is divided into two parts; the first deals with ordinary differential equations while the second deals with partial differential equations. Let us briefly describe the structure and the content of the book. Each chapter is structured into sections and subsections, if any. The content of each section or subsection is arranged into the elementary units that we call problems. A problem is a differential equation with or without additional condition. Each problem is numbered and then solved. The solution of a problem shares the same number as the problem. When we propose several solutions to a problem, we distinguish them by different so-called `approaches`. If we have several similar problems, we group them forming a numbered list of pairs containing a statement with its solution.

Chapter 1 contains some notions and results on special functions because many results on differential equations are expressed by these functions. The topics of this chapter include: existence and uniqueness theorems, exponential, logarithmic, and trigonometric functions, Gaussian, error, and sign function, unit step, Dirac delta function, gradient, divergence, and Laplacian, gamma, and beta functions, hypergeometric equations, hyperbolic functions, Bessel functions, Legendre functions, Jacobi polynomials, Mathieu functions, and elliptic equations and functions.

Chapter 2 is a brief introduction to simple ordinary differential equations by *Mathematica*. The sections of this chapter discuss: classification of certain ordinary differential equations, planar phase portrait, solid phase portrait, straight integration of first-order derivatives, differential equations with separable variables, and homogeneous equations.

Chapter 3 deals with a large number of first-order ordinary differential equations. Its sections present: first-order linear differential equations, first-order inverse linear differential equations, Bernoulli differential equations, Riccati differential equations, exact first-order ordinary differential equations, Lagrange differential equations, implicit differential equations, and other first-order differential equations.

Chapter 4 is the last one of the first part. It deals with higher order ordinary differential equations and with systems of ordinary differential equations. Their list contain: second order linear differential equations, Bessel differential equations, Legendre differential equations, Mathieu differential equations, equations with discontinuous coefficients or right-hand sides, other higher order differential equations, and systems of differential equations.

The second part of the book contains six chapters.

Chapter 5 deals with first-order partial differential equations, more precisely: linear, quasilinear, and nonlinear first-order partial differential equations.

The next chapter focuses on linear hyperbolic partial differential equations. The equations discussed in this chapter are: with constant coefficients, with variable coefficients, on curvilinear domains, in solid space, and the Klein-Gordon equation.

Chapter 7 treats the sine-Gordon equations, nonlinear and higher dimension hyperbolic equations.

Chapter 8 focusses on elliptic partial differential equation. The chapter starts with some considerations on harmonic function. Then the Laplace and Poisson equations are discussed on rectangles, arbitrary domains, and in higher dimensions.

Chapter 9 deals with parabolic partial differential equations. The topics include the 1D homogeneous and inhomogeneous equations, the 2D homogeneous and inhomogeneous equations, the Burgers equations, the ansatz methods, the Fisher equations, the Fitzhugh-Nagumo and the Calogero equations, the double sine-Gordon equation, and the continuous dependence on a parameter.

The last chapter of the present book concerns with third and higher order nonlinear partial differential equations. It is a rather large chapter discussing the following subjects: the Korteweg-de Vries equations, the Dodd-Bullough-Mikhailov equation, the Tzitzeica-Dodd-Bullough equation, the modified Kawahara equation, the Benjamin equation, the Kadomtsev-Petviashvili equations, the Sawada-Kotera equation, and finally the Kaup-Kupershmidt equation.

Our teaching experience showed us that it is more profitable to ask the students to suggest or give "a solution" instead of "the solution" of a problem or exercise. Sometimes with some effort one can give a different solution highlighting different features of the problem in discussion. Therefore we often suggest several approaches. For instance, Problem 3.15 has four approaches, Problem 3.18 has four approaches, Problem 3.23 has five approaches, and Problem 5.8 has four approaches.

The problems are discussed in detail helping the reader to understand the reasoning with *Mathematica*. Sometimes the reader is left taking the benefit of the Help menu and other sources freely and generously offered by Wolfram Research at the site www.wolfram.com. A good source of ideas and discussions is offered by the Mathematica Stack Exchange site.

All the problems in this book are solved by *Mathematica*. All the corresponding figures are also made by *Mathematica*. A well motivated pleading for visualization in mathematics is contained in [Palais1999].

The *Mathematica* codes are written by typewriter fonts, whereas the answers to the problems are given by gray typewriter fonts. This style is used in some cornerstone books [Trott1], [Trott2], [Trott3], and [Trott4]. Also with gray typewriter fonts are inserted some comments that we find useful. In this way we try to offer the inputs and outputs as close as possible to the format of notebooks in *Mathematica*.