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Sinopsis

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Green's Functions and Linear Differential Equations: Theory, Applications, and Computation presents a variety of methods to solve linear ordinary differential equations (ODEs) and partial differential equations (PDEs). The text provides a sufficient theoretical basis to understand Green's function method, which is used to solve initial and boundary value problems involving linear ODEs and PDEs. It also contains a large number of examples and exercises from diverse areas of mathematics, applied science, and engineering.

Taking a direct approach, the book first unravels the mystery of the Dirac delta function and then explains its relationship to Green's functions. The remainder of the text explores the development of Green's functions and their use in solving linear ODEs and PDEs. The author discusses how to apply various approaches to solve initial and boundary value problems, including classical and general variations of parameters, Wronskian method, Bernoulli's separation method, integral transform method, method of images, conformal mapping method, and interpolation method. He also covers applications of Green's functions, including spherical and surface harmonics.

Filled with worked examples and exercises, this robust, self-contained text fully explains the differential equation problems, includes graphical representations where necessary, and provides relevant background material. It is mathematically rigorous yet accessible enough for readers to grasp the beauty and power of the subject.