1.	Record Nr.	UNINA9910958531003321
	Autore	Yang Xin-She
	Titolo	Introduction to computational engineering with Matlab / / Xin-She Yang
	Pubbl/distr/stampa	Cambridge, : Cambridge International Science Publishing, 2006
	ISBN	1-904602-98-3 1-907343-45-8 1-4416-3884-9
	Descrizione fisica	1 online resource (262 p.)
	Disciplina	620.00151
	Soggetti	Engineering mathematics - Data processing Mathematical analysis
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Note generali	Description based upon print version of record.
	Nota di bibliografia	Includes bibliographical references and index.
	Nota di contenuto	""Preface""; ""Acknowledgements""; ""Summary""; ""About the Author""; ""Contents""; ""1. Introduction""; ""1.1 Computational Engineering""; ""1.2 DIY Philosophy""; ""1.3 How to Use the Book""; ""2. Vectors and Matrices""; ""2.1 Vector Analysis""; ""2.1.1 Vectors""; ""2.1.2 Dot Product and Norm""; ""2.1.3 Cross Product""; ""2.1.4 Differentiation of Vectors""; ""2.1.5 Three Basic Operators""; ""2.1.6 Some Important Theorems""; ""2.2 Matrix Algebra""; ""2.2.1 Matrix""; ""2.2.2 Determinant""; ""2.2.3 Inverse""; ""2.2.4 Solution of linear systems""; ""3. Differential Equations"" ""3.1 Ordinary Differential Equations""""3.1.1 First Order ODE""; ""3.1.2 Higher Order ODEs""; ""3.2 Partial Differential Equations""; ""3.2.1 First Order Partial Differential Equation""; ""3.2.2 Classification of Second-Order Equations""; ""3.2.3 Classic PDEs""; ""3.2.4 Other PDEs""; ""4. Finite Difference Method""; ""4.1 Introduction""; ""4.2 Integration of ODEs""; ""4.2.1 Euler Scheme""; ""4.2.2 Leap-Frog Method""; ""4.2.3 Runge-Kutta Method""; ""4.2.4 Belousov-Zhabotinsky Oscillator""; ""5. Hyperbolic Equations""; ""5.1 First-Order Hyperbolic Equation""; ""5.2 Second Order Wave Equation"" ""5.3 Sine-Gordon Equation""""6. Parabolic/Elliptical Equations""; ""6.1 Parabolic Equation""; ""6.2 Elliptical Equation""; ""7. Pattern Formation""; ""7.1 Pattern Formation""; ""7.2 Reaction-Diffusion System""; ""8. Finite

| Sommario/riassunto | This book strives to provide a concise introduction to computational engineering by introducing a wider range of numerical methods commonly used in computational modelling and scientific computing. These methods in-clude finite difference methods, finite volume methods, finite element methods, virtual bee algorithms, and cellu-lar automata. It also covers a wide spectrum of advanced topics in engineering applications, and these advanced topics include elasticity, heat conduction, reaction-diffusion system, optimisation, stochastic cellular auto-mata, combustion, consolidation, heat transfer of carbon nanotubes, and pattern formation. The accompanied concise Matlab programs, no more than 100 lines each, demonstrate how each numeri-cal method works. The animation and visualization of the results provide a first hand experience to the readers, es-pecially for undergraduates and graduates, to master the fundamentals of the numerical methods. These Matlab programs can also be modified |