Gaussian Random Rough Surface Matlab Code

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Gaussian Random Rough Surface Matlab
The surface has a Gaussian height distribution and % exponential autocovariance functions (in both x and y), where rL is the % length of the surface side, h is the RMS height and clx and cly are the % correlation lengths in x and y. Omitting cly makes the surface isotropic.

Random Gaussian Surface Generation - MATLAB Answers ...
% The surface has a Gaussian height distribution function and a Gaussian % autocovariance function, where rL is the length of the surface, h is the % RMS height and cl is the correlation length.

How can i generate gaussian random process using matlab ...
For modelling and simulative purposes random rough surfaces with Gaussian statistics can be generated using a method outlined by Garcia and Stoll, where an uncorrelated distribution of surface points using a random number generator (i.e. white noise) is convolved with a Gaussian filter to achieve correlation.

Rough surface generation & analysis - MySimLabs
This code generates artificial randomly rough isotropic surfaces. These surfaces could be useful for simulating surface roughness or topographies from nanometre features of engineering surfaces to large-scale topography of mountains, terrains or landscapes. The code is based on simulating the surface topography/roughness by means of fractals.

Surface generator: artificial randomly rough surfaces ...
When investigating the interaction between two bodies with rough surfaces, numerical models are often utilised to systematically characterise the influence the roughness has on leakage, friction, etc. These models, naturally, require a representation of the topography of the interacting surfaces as an input.

Generating randomly rough surfaces with given height ...
Link The core MATLAB function randn will produce normally-distributed random numbers with zero mean and unity standard deviation. If you want the numbers to be limited to those <=1, this will work: q = randn (1,10);

Gaussian distributed random numbers - MATLAB Answers ...
I'm assuming you want to interpolate between the given 2D co-ordinates to try and create a Gaussian surface. What you need to use is griddata (Octave doc) (MATLAB doc), where you specify your (x,y,z) points, then specify the 2D co-ordinates that form the output surface that you want.

matlab - Octave: 3D Surface plot for Gaussian distribution ...
A rough surface f (x, y) can be seen as composed of many elementary waves of the form where ? is a phase angle. The phase angle also makes it possible to express sine functions due to the relationship. For a completely random surface, it should hold that the phase angle ? can take any value in, say, the interval 0 to ? or – ? /2 to ? /2.

How to Generate Random Surfaces in COMSOL Multiphysics ...
Let me start off by saying that I am extremely new to MATLAB. I would to use these functions and turn them into a 3d plot using surf. I have already made a mesh grid of my x and y but I am confused on how to plug my gaussian function in as Z.

Plotting a 3d gaussian function using surf - MATLAB ...
Reset Random Number Generator Save the current state of the random number generator. Then create a 1-by-5 vector of normal random numbers from the normal distribution with mean 3 and standard deviation 10. s = rng; r = normrnd (3,10, [1,5])

Normal random numbers - MATLAB normrnd
MATLAB_WP / surface generators / nonGaussianGenerator.m Go to file Go to file T; Go to line L; Copy path Cannot retrieve contributors at this time. 173 lines (124 sloc) 5.3 KB Raw Blame % Non-Gaussian Surface Generator % % The purpose of this script is to generate non-Gaussian random surfaces % with specified standard deviation, autocorrelation length, skewness and % kurtosis. % % References ...

MATLAB_WP/nonGaussianGenerator.m at master · duf59/MATLAB ...
Continuous and repetitive gaussian random... Learn more about continuous random function MATLAB

Continuous and repetitive gaussian random function in matlab
Random, two dimensional (2D) matrices with desired size and statistical parameters such as correlation length and root mean square height of the profile are generated in MATLAB®. In order to obtain desired surface parameters, we employ a Gaussian random 2D matrix generator and subsequent filtering with Gaussian 2D filter.

Random gaussian rough surfaces for full-wave ...
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MATLAB Answers; File Exchange; Cody; Blogs; Participate. Ask a question; Answer questions; Upload files; Connect to GitHub; Share a link; Solve Cody problems; Topics. Distance Learning Community; SimBiology Community; Power Electronics Community; More. Treasure Hunt; Highlights; Advisors; Virtual Badges; About; RAKESH MAHARANA 2 total contributions since 2019 RAKESH MAHARANA's Badges ...

Radar scattering and imaging of rough surfaces is an active interdisciplinary area of research with many practical applications in fields such as mineral and resource exploration, ocean and physical oceanography, military and national defense, planetary exploration, city planning and land use, environmental science, and many more. By focusing on the most advanced analytical and numerical modeling and describing both forward and inverse modeling, Radar Scattering and Imaging of Rough Surfaces: Modeling and Applications with MATLAB® connects the scattering process to imaging techniques by vivid examples through numerical and experimental demonstrations and provides computer codes and practical uses. This book is unique in its simultaneous treatment of radar scattering and imaging. Key Features Bridges physical modeling with simulation for resolving radar imaging problems (the first comprehensive work to do so) Provides excellent basic and advanced information for microwave remote-sensing professionals in various fields of science and engineering Covers most advanced analytical and numerical modeling for both backscattering and bistatic scattering Includes MATLAB® codes useful not only for academics but also for radar engineers and scientists to develop tools applicable in different areas of earth studies Covering both the theoretical and the practical, Radar Scattering and Imaging of Rough Surfaces: Modeling and Applications with MATLAB® is an invaluable resource for professionals and students using remote sensing to study and explain the Earth and its processes. University and research institutes, electrical and radar engineers, remote-sensing image users, application software developers, students, and academics alike will benefit from this book. The author, Kun-Shan Chen, is an internationally known and respected engineer and scientist and an expert in the field of electromagnetic modeling.

This book is a self-contained, programming-oriented and learner-centered book on finite element method (FEM), with special emphasis given to developing MATLAB® programs for numerical modeling of electromagnetic boundary value problems. It provides a deep understanding and intuition of FEM programming by means of step-by-step MATLAB® programs with detailed descriptions, and eventually enabling the readers to modify, adapt and apply the provided programs and formulations to develop FEM codes for similar problems through various exercises. It starts with simple one-dimensional static and time-harmonic problems and extends the developed theory to more complex two- or three-dimensional problems. It supplies sufficient theoretical background on the topic, and it thoroughly covers all phases (pre-processing, main body and post-processing) in FEM. FEM formulations are obtained for boundary value problems governed by a partial differential equation that is expressed in terms of a generic unknown function, and then, these formulations are specialized to various electromagnetic applications together with a post-processing phase. Since the method is mostly described in a general context, readers from other disciplines can also use this book and easily adapt the provided codes to their engineering problems. After forming a solid background on the fundamentals of FEM by means of canonical problems, readers are guided to more advanced applications of FEM in electromagnetics through a survey chapter at the end of the book. Offers a self-contained and easy-to-understand introduction to the theory and programming of finite element method. Covers various applications in the field of static and time-harmonic electromagnetics. Includes one-, two- and three-dimensional finite element codes in MATLAB®. Enables readers to develop finite element programming skills through various MATLAB® codes and exercises. Promotes self-directed learning skills and provides an effective instruction tool.

This book addresses advanced numerical techniques used to significantly reduce the complexity and memory requirement for solving the linear system that results from the discretization of the boundary integral equations by the Method of Moments (MoM). Typically, the problem of the VHF wave scattering from an object above a rough sea surface in a ducting environment is investigated as is the HF radar propagation above the Earth in the presence of islands. Along with these topics, the book also covers rapid asymptotic theories, which are derived and compared with references methods based on the MoM. Presents tactics on scattering from both rough surfaces and near a rough surface Discusses radar propagation in ducting environments Includes numerical techniques to accelerate MoM

A timely and authoritative guide to the state of the art of wavescattering Scattering of Electromagnetic Waves offers in three volumes acomplete and up-to-date treatment of wave scattering by randomdiscrete scatterers and rough surfaces. Written by leadingscientists who have made important contributions to wave scatteringover three decades, this new work explains the principles, methods,and applications of this rapidly expanding, interdisciplinaryfield. It covers both introductory and advanced material andprovides students and researchers in remote sensing as well asimaging, optics, and electromagnetic theory with a one-stopreference to a wealth of current research results. Plus, Scatteringof Electromagnetic Waves contains detailed discussions of bothanalytical and numerical methods, including cutting-edge techniquesfor the recovery of earth/land parametric information. The three volumes are entitled respectively Theories andApplications, Numerical Simulation, and Advanced Topics. In thesecond volume, Numerical Simulations, Leung Tsang (University ofWashington) Jin Au Kong (MIT), Kung-Hau Ding (Air Force ResearchLab), and Chi On Ao (MIT) cover: * Layered media simulations * Rough surface and volume scattering simulations * Dense media models and simulations * Electromagnetic scattering by discrete scatterers and a buriedobject * Scattering by vertical cylinders above a surface * Electromagnetic waves scattering by vegetation * Computational methods and programs used for performing varioussimulations

A well-known statement says that the PID controller is the "bread and butter" of the control engineer. This is indeed true, from a scientific standpoint. However, nowadays, in the era of computer science, when the paper and pencil have been replaced by the keyboard and the display of computers, one may equally say that MATLAB is the "bread" in the above statement. MATLAB has became a de facto tool for the modern system engineer. This book is written for both engineering students, as well as for practicing engineers. The wide range of applications in which MATLAB is the working framework, shows that it is a powerful, comprehensive and easy-to-use environment for performing technical computations. The book includes various excellent applications in which MATLAB is employed: from pure algebraic computations to data acquisition in real-life experiments, from control strategies to image processing algorithms, from graphical user interface design for educational purposes to Simulink embedded systems.

Electromagnetic wave scattering from randomly rough surfaces inthe presence of scatterers is an active, interdisciplinary area ofresearch with myriad practical applications in fields such asoptics, acoustics, geoscience and remote sensing. In this book, the Method of Moments (MoM) is applied to compute thefield scattered by scatterers such as canonical objects (cylinderor plate) or a randomly rough surface, and also by an object aboveor below a random rough surface. Since the problem is considered tobe 2D, the integral equations (IEs) are scalar and only the TE(transverse electric) and TM (transverse magnetic) polarizationsare addressed (no cross-polarizations occur). In Chapter 1, the MoMis applied to convert the IEs into a linear system, while Chapter 2compares the MoM with the exact solution of the field scattered bya cylinder in free space, and with the Physical Optics (PO)approximation for the scattering from a plate in free space.Chapter 3 presents numerical results, obtained from the MoM, of thecoherent and incoherent intensities scattered by a random roughsurface and an object below a random rough surface. The finalchapter presents the same results as in Chapter 3, but for anobject above a random rough surface. In these last two chapters,the coupling between the two scatterers is also studied in detailby inverting the impedance matrix by blocks. Contents 1. Integral Equations for a Single Scatterer: Method of Momentsand Rough Surfaces. 2. Validation of the Method of Moments for a SingleScatterer. 3. Scattering from Two Illuminated Scatterers. 4. Scattering from Two Scatterers Where Only One isIlluminated. Appendix. Matlab Codes. About the Authors Christophe Bourlier works at the IETR (Institutd'Electronique et de Télécommunications de Rennes)laboratory at Polytech Nantes (University of Nantes, France) aswell as being a Researcher at the French National Center forScientific Research (CNRS) on electromagnetic wave scattering fromrough surfaces and objects for remote sensing applications andradar signatures. He is the author of more than 160 journalarticles and conference papers. Nicolas Pinel is currently working as a Research Engineer at theIETR laboratory at Polytech Nantes and is about to join AlyotechTechnologies in Rennes, France. His research interests are in theareas of radar and optical remote sensing, scattering andpropagation. In particular, he works on asymptotic methods ofelectromagnetic wave scattering from random rough surfaces andlayers. Gildas Kubické is in charge of the "Expertise inelectroMagnetism and Computation" (EMC) laboratory at the DGA(Direction Générale de l'Armement), French Ministryof Defense, where he works in the field of radar signatures andelectromagnetic stealth. His research interests includeelectromagnetic scattering and radar cross-section modeling.

Covers the latest developments in PNT technologies, including integrated satellite navigation, sensor systems, and civil applications Featuring sixty-four chapters that are divided into six parts, this two-volume work provides comprehensive coverage of the state-of-the-art in satellite-based position, navigation, and timing (PNT) technologies and civilian applications. It also examines alternative navigation technologies based on other signals-of-opportunity and sensors and offers a comprehensive treatment on integrated PNT systems for consumer and commercial applications. Volume 1 of Position, Navigation, and Timing Technologies in the 21st Century: Integrated Satellite Navigation, Sensor Systems, and Civil Applications contains three parts and focuses on the satellite navigation systems, technologies, and engineering and scientific applications. It starts with a historical perspective of GPS development and other related PNT development. Current global and regional navigation satellite systems (GNSS and RNSS), their inter-operability, signal quality monitoring, satellite orbit and time synchronization, and ground- and satellite-based augmentation systems are examined. Recent progresses in satellite navigation receiver technologies and challenges for operations in multipath-rich urban environment, in handling spoofing and interference, and in ensuring PNT integrity are addressed. A section on satellite navigation for engineering and scientific applications finishes off the volume. Volume 2 of Position, Navigation, and Timing Technologies in the 21st Century: Integrated Satellite Navigation, Sensor Systems, and Civil Applications consists of three parts and addresses PNT using alternative signals and sensors and integrated PNT technologies for consumer and commercial applications. It looks at PNT using various radio signals-of-opportunity, atomic clock, optical, laser, magnetic field, celestial, MEMS and inertial sensors, as well as the concept of navigation from Low-Earth Orbiting (LEO) satellites. GNSS-INS integration, neuroscience of navigation, and animal navigation are also covered. The volume finishes off with a collection of work on contemporary PNT applications such as survey and mobile mapping, precision agriculture, wearable systems, automated driving, train control, commercial unmanned aircraft systems, aviation, and navigation in the unique Arctic environment. In addition, this text: Serves as a complete reference and handbook for professionals and students interested in the broad range of PNT subjects Includes chapters that focus on the latest developments in GNSS and other navigation sensors, techniques, and applications Illustrates interconnecting relationships between various types of technologies in order to assure more protected, tough, and accurate PNT Position, Navigation, and Timing Technologies in the 21st Century: Integrated Satellite Navigation, Sensor Systems, and Civil Applications will appeal to all industry professionals, researchers, and academics involved with the science, engineering, and applications of position, navigation, and timing technologies. pnt21book.com

* The first book on the subject. * Written by an acknowledged expert in the field. * The techniques discussed have important applications to wireless engineering.

Modeling and machining are two terms closely related. The benefits of the application of modeling on machining are well known. The advances in technology call for the use of more sophisticated machining methods for the production of high-end components. In turn, more complex, more suitable, and reliable modeling methods are required. This book pertains to machining and modeling, but focuses on the special aspects of both. Many researchers in academia and industry, who are looking for ways to refine their work, make it more detailed, increase their accuracy and reliability, or implement new features, will gain access to knowledge in this book that is very scare to find elsewhere.

Until now, novices had to painstakingly dig through the literature to discover how to use Monte Carlo techniques for solving electromagnetic problems. Written by one of the foremost researchers in the field, Monte Carlo Methods for Electromagnetics provides a solid understanding of these methods and their applications in electromagnetic computation. Including much of his own work, the author brings together essential information from several different publications. Using a simple, clear writing style, the author begins with a historical background and review of electromagnetic theory. After addressing probability and statistics, he introduces the finite difference method as well as the fixed and floating random walk Monte Carlo methods. The text then applies the Exodus method to Laplace's and Poisson's equations and presents Monte Carlo techniques for handing Neumann problems. It also deals with whole field computation using the Markov chain, applies Monte Carlo methods to time-varying diffusion problems, and explores wave scattering due to random rough surfaces. The final chapter covers multidimensional integration. Although numerical techniques have become the standard tools for solving practical, complex electromagnetic problems, there is no book currently available that focuses exclusively on Monte Carlo techniques for electromagnetics. Alleviating this problem, this book describes Monte Carlo methods as they are used in the field of electromagnetics.