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Arnold, V.I., Varchenko, A.N., Hussain-zade, SM, : Singularity of differentiated cards. I. Classification of critical points, caustics and wave fronts. Moscow: Science, 1982. English broadcast: Boston: Birkheuser, 1985. It's a sbl. 513.58001, zbl. 554.58001Google ScholarArnol'd, V.L., Varchenko, A.N., Hussain-Sade, SM: Singularity of various map maps. II. Monodromia and asymptotics of integrals. Moscow: Science, 1984. It's a sbl. 545.58001Gugel ScientistBavalov, N.S., Panasenko, GP: Averaging processes in the periodic media. Mathematical tasks of the mechanics of composite materials. Moscow: Science, 1984. sbl 607.73009Google ScholarBirkhoff, G.D.: Quantum Mechanics and Asymptotic Series. Bull. Am. Mat. Soc. 39, 681-700 (1933). Jrb. 59.1530MathSciNetCrossGoogle ScholarClarkson, P.A., McLeod, J.B.: Connection Formula for the second transcendent Painlev. Lect. Notes Mathematics. 964,135-142 (1982). 502,34007 euros. MathSciNetCrossRefGoogle ScholarCoddington, E.A., Levinson, N.: Theory of conventional differential equations. New York: McGraw-Hill, 1955. It's a sbl. 64, 330zbMATHGoogle ScholarCopson, E.T.: Asymptomatic extensions. Cambridge: University Press, 1965. It's a sbl. 123, 260zbMATHCrossRefGoogle Scholarde Bruijn, NG: Asymptotic methods in analysis. Amsterdam: North Holland, 1958 82.42 (2nd Ed. 1975, 3rd Ed., New York: Dover 1981) zbMATHGoogle ScholarDebye, P., Semikonvergente Entwicklungen f'r die silinder-Funktionen und ihre Ausdehnung ins Komplexe. Munich, Berlin, 40, No 5, 1-29 (1910) Google ScholarErdelyi, A.: Asymptotic extensions. New York: Dover Publ, 1956. Sbl 70, 290. zbMATHGoogle ScholarEvgrafov, M.A.: Asymptotic assessments and whole functions. 3rd place. ed. Moscow: Science, 1979. sbl 447.30016zbMATHGoogle ScholarFedoryuk, M.V.: Saddle Method. Moscow: Science, 1977zbbMATHGoogle ScholarFedoryuk, M.V.: Asymptotic methods of linear conventional differential equations. Moscow: Science, 1983. It's a sbl. 538.34001zbMATHGoogle ScholarFedoryuk, MV: Asymptotics: Integrals and Series. Moscow: Science, 1987zbbMATHGoogle ScholarFr'man, N., Freoman, P.O.: Approaching JWKB: contribution to theory. Amsterdam: North Holland, 1965. It's a sbl. 129,419zbMATHGoogle ScholarGreen, G.: On the movement of waves in a variable channel of small depth and width. Trans. Camb. Phil. Soc. 6, 457-462 (1837)Google ScholarHeading, J.: Introduction to phase-integral methods. London: Methuen, New York: Wylie, 1962. It's a sbl. 115.71zbbMATHGoogle ScholarHille, E.: Conventional differential equations in a complex area. New York: Wiley, 1976. It's a sbl. 343.34007zbMATHGoogle ScholarInce, E.L.: Ordinary differential equations. London: 1927. Longmans, Green and Co. jrb. 53, 399zbMATHGoogle ScholarKelvin Lord: On waves produced by one pulse in water of any depth, or in a dispersive environment. Phil. Mag. 5, 252-255 (1887)Google ScholarLanger, R.E.: Asymptotic Solutions of Some second-order differential equations. Trans Am. Mat. Soc. 36, 90-106 (1934). No 8, 312CrossRefGoogle ScholarLaplace, Le Marquis de: Toori analyst de probabilit's. Paris: Mme Ve Courcier 1812Google ScholarLiouville, J.: Sur le d'velppement des fonctions ou partie de fonction en series. J. Math. Pures Appl. 2, No. 2.16-36 (1837)Google ScholarMaslov, V.P.: Theory of Perturbations and Asymptomatic Methods. Moscow: The isda. Moz. Go. Univ., 1965. French transl.: Paris: Gauthier-Villars 1972. It's a sbl. 247.47010Gules ScientistMaslov, V.P., Fedoryuk, M.V. Kwasi classic approximation to the equations of quantum mechanics. Moscow: Science, 1976. It's a sbl. 449.58002 English Broadcast: Dordrecht Reidel 1981Google ScholarNaimark, M.A.: Linear differential operators. (2nd place in Moscow: Science, 1969. zbl 193, 41) New York: Ungar Vol. I (1967. zbl. 219.34001), II (1968 No. 227.34020) (1st place 1954 No. 57, 71)Google ScholarOlver, F.W.J.: Introduction to iytops and special functions. New York-London: Academic Press, 1974. It's a sbl. 308.41023zbMATHGoogle ScholarRiekstin, E.J.: Asymptotic extensions of integrals. Vols. 1, 2, 3. Riga: zinatne 1974, 1977, 1981. Volume 1 (Sbl. 292.41021), Volume 2 (Sbl. 358.41007), Volume. 3 (sbl. 483.41001) Google ScholarRiemann, B.: Sullo svolgimento del quoziente di due serie ipergeometriche in frazione continua infinita, 1863. In: Gesammelte Werke, Leipzig: Teubner 1876. Jrb. 8, 231Google ScholarRiemann, B.: sber die Darstellbarkeit einer Funktion durch eine trigonometrische Reihe. Abhandle. Koenigl. Heselsh. der Wiss., 1867Google ScholarSegur, H., Ablowitz, M.J.: Asymptotic solution to equations of nonlinear evolution and transcendental painlev. Physics D, 1-2, 105-184 (1981) Google ScholarSibuya, Y.: Global theory of the second-order linear differential equation with polynomial coefficient. Amsterdam: North Holland, 1975. It's a sbl. 322.34006zbMATHGoogle ScholarStokes, G.G.: On the rupture of arbitrary constants that appear in various events. Trans. Camb. Phil. Soc. 10 (1857)Google ScholarTamarkin, Ya.D.: On some general issues in the theory of conventional linear differential equations and about the expansion of arbitrary functions in the series. Petrograd, 1917. Jrb. 47, 944Google ScholarTitchmarsh, E.C.: Expansion of Eigenfunction associated with second-order differential equations. Oxford: Clarendon Press, Volume 1.1946; It's Tom. 2,1958. 61 135 euros. It's a sbl. 57, 276zbMATHGoogle ScholarVainberg, B.R.: Asymptotic methods in equations of mathematical physics. Moscow: The isda. Moz. Go. Univ. 1982. 518.35002Gogle ScholarWasow, W.: Asymptotic extensions for conventional differential equations. New York: Wiley - Interscience, 1965. It's a sbl. 133, 353. English transl.: Moscow: World 1968zbMATHGoogle ScholarWasow, W.: Linear turning point theory. New York: Springer-Verlag, 1985. It's a sbl. 558.34049zbMATHCrossGoogle ScholarWhittaker, E.T., G.N.: Course of modern analysis. Cambridge: University Press, 1927. Jrb. 53,180zbMATHGoogle ScholarPage 2 Back Matter Infinite series, and their analogue-integral representations have become fundamental tools in mathematical analysis since the second half of the seventeenth century. They provided the means to introduce into the analysis all o (so-called transcendental functions, including those now called elementary (logarith, exponential and trigonometry functions). Many abstract divisions of mathematics (such as functional analysis) have emerged and been developed to study the series. There are two main areas in the development of the series theory. One is the rationale for infmite series operations, the other is the creation of methods to use the series in solving mathematical and applied tasks. Both directions developed in parallel Initially progress in the first direction was much less, but in the end, progress in the second direction has always proved more difficult. The field of Koordinatentransformation Mathematica Tom form an integral mathematical analysis of mathematical methods of representation of editors and accessories 1.Academy of Sciences USSRSthlovsky Mathematical InstituteSlovous USSR2.Institute of Scientific Information (VNITI)Moscow USSR 什么是话题 无论是部作品、个 还是件事 都往往可以衍生出许多不同的话题。还是还是 将这些话题细分出来,分别进行讨论,会有更多收获。 板凳 wl5f 发表于 2015-5 02:06:37 No 只看作者 Asymptic Analysis Methods N. G. DE Bruij 返回列表 发帖 回复 GMT-8, 2020-10-17 22:23 V.I. Klyazkin, in the dynamics of stochastic systems, 2005As, only a few dynamic systems are analyzed, giving solutions in general form. It has proved more effective to use an asymptotic method in which the statistical characteristics of dynamic problem-solving expand within the powers of a small parameter, which essentially represents the relationship between the time of correlation of accidental impact to observation time or to other characteristic time scales of the problem (in some cases it may be spatial rather than time scales). This method is, in fact, a generalization of the theory of the Brown movement. This is called a delta-correlated random process (field) approximation. Alexander Alekseev, in principle Basics of design of magnetic thermonuclear reactors, 2018Production composite windings OF MS - are 3D objects with periodic structure. Scenic analysis of their stressed state is often carried out using asymptomatic methods. In the first phase of the analysis, the periodic cell is modeled using the local end-element method (FEM). Benchmark problems are solved to structure the cellular problem and to determine the effective (visible) thermo-elite properties of winding. In the second phase, the global end model MS is built. The winding is considered as a homogeneous anisotropic object, the properties of which were determined in the first stage. Numerical analysis is done using standard computer modeling tools such as ANSYS. Applying ponderomotive forces to grid model nodes is a separate task, as these forces can be identified using special software and the grids are different from those used in strength calculations. As a result, we get the stress-voltage of the condition of the supporting structures and the average voltage of the field, as well as the deformation of composite structures. In the third stage, we will return to the local model of the final element of the cell. Actual stresses and deformities in coil materials, necessary to assess the strength and lifespan of the structure, are determined by the intention of basic problem solutions corrected to produce effective deformations. To illustrate this, consider the quantitative estimates of the resistance of the ITER PF1 coil to cyclical loads (Figure 3.5). The coil is supported by nine sliding bearings that rest on the TFC frames. The coil has 256 conductors, enclosed in steel jackets (Figure 12.4). An electrically insulated conductor, whose local grid model is given on the same digit, is taken as a periodic cell. Figure 12.4. A diagram that illustrates the resistance of the ITER PF1 coil to cyclical loads. (A) Winding transverse Frequency cell model. (Copyright ITER, 2017) The 40-degree coil segment between the middle points of neighboring supports is considered to be an object modeled by FEM (Figure 12.5). Coil loading starts with tightening the fastenings. Figure 12.5. The ultimate elemental model of the PF1 coil segment. (Copyright ITER, 2017) Then the coil is cooled to 4 K. On the nodes of the final elemental grid, the forces acting at the characteristic time of the cycle are applied. Each step requires that the current coil supports offset values be applied on border surfaces. These values are calculated based on the global model analysis of the TFC system. Assessing the stresses and stresses in the coil elements is part of the calculation. At this stage, calculated voltages are medium --ed. Appropriate stress fields in rice. 12.6 for the time of the IM cycle (maximum voltages) and EOB (minimum voltages). Figure 12.6. Medium toroid voltages in the PF1 coil (MPa). (Copyright ITER, 2017) Using computational data in your hand, you can identify the average cyclical voltages in the winding (Figure 12.6) as well as the actual voltages in the conductor's jacket (Figure 12.7). Figure 12.7. Toroidal stress in the jacket of the conductor coil PF1 (MPa). (ITER Copyright Organization, 2017) Lifetime is estimated by increased crack fatigue. The actual voltage values in the jacket and the asymmetry ratio of the R-Sminem-SresSmaxem-Sres loading cycle correspond to the point in the pic. 12.8. The actual voltage calculation was the residual strain of Sres, which develops during the reel winding. The jacket clearly exceeds the strength criterion, as shown in figure 12.8.Figure 12.8. Maximum allowable stress jackets as a function of the asymmetry of the boot cycle. (Copyright ITER, 2017) Actual stresses in the insulation layer and the strength of insulation are determined in a similar way. Replacing composite winding with a homogeneous anisotropic object is an effective method of analyzing MS mechanical behavior. It should be based on a state of cyclical symmetry when converting the average to the actual voltage. This can lead to some error in the calculation if the area in question is close to the layers of the winding surface. In PF1, for example, these areas are the most congested (Figure 12.6). However, when applied to PF1, this approach demonstrates an adequate safety factor and confirms its resistance to cyclical stresses. When used, the PF1 conductor is close to a single-axis stressful state. Thus, it is also possible to determine how sustainable the winding is by simply converting medium strains into which which for the relative content of steel through a cross-section conductor. Sub-modeling is used to produce more accurate results with local sophistication in areas of concern (extreme winding layers). It consists of building and solving a local scaling or subtype model based on global (rough) modeling results (Figure 12.9). Figure 12.9. Typical stress fields (MPa) in the winding (A) and along the conductor's jacket (B) in the coil of the polyoid field of the tokamak. (COPYRIGHT ITER, 2017) Another solution for accurate localized stress is to introduce a local model into the global. For example, the KSTAR TOKAMK ISkaaka is shown in rice. 12.10 For the busiest equatorial area, CS has built an exquisite model. To align the grids of global and local models, the winding is presented as several layers that are different in relation to each other. Figure 12.10. KSTAR tokamak CS end element models. (A) A Global model showing current winding and load-carrying structures and (B) location model, Showing the conductor axially aligned and offset.D.A.S. REES, in transport phenomena in porous media, 1998All three of the above methods were used to obtain a boundary layer of equations for convection in the environment The first method is often used not as an asymptotic method, but rather as an approximation to the guiding equations where the spread of the stream was neglected. Many users of this method, especially those who work outside the field of porous medium convection, usually refer to what is called the approximation of the boundary layer, neglecting such derivatives, and then proceed to a set of replacements similar to expressions (4). In the interests of balance, it must be said that the analyses of the higher order of Chang and Cheng and Cheng and Hsu show that Method 1 can be formulated in terms of careful asymptomatic analysis. However, Method 1 can very easily lead to incorrect results if not applied correctly, and this is especially true for non-suggestive threads. An example of this is the above (method 1) basic flow analysis taken from Chan and Chang, which is associated with vortex instability of the sloping thermal boundary layer of the flow. Although the adrift spread was ignored in favor of cross-flow diffusion, due to the subtlety of the boundary layer, both temperature terms on the right side of the equation (3a) were retained. There are good formal reasons for this when using Method 2, and the tilt of the surface should be small enough. But there is no mention of tilting restrictions in Chan and Chang's text, and it argues that stability analysis is valid for a wide range of inclinations. However, balancing the two terms on O(1) tilts necessarily imply that both the flow and the transverse terms of diffusion must be of the same order of magnitude, and therefore that the flow is elliptical. Of course, this negates the initial assumption that the approach of the boundary layer is valid and makes their results incorrect. Method 2 does not suffer from the risk of improper duplication, as it is a rigorous asymptomatic analysis. However, as can be seen below, there are difficulties in presenting an equally thorough analysis of stability within the same framework. This can be illustrated best, given the brief vortex of stability generally tending to heat the surface with a 0'lt;φ'lt;'2. If nondimenation (6) with appropriate scales for q, U, V, W and P is used, then equations (1) become (15b, c, d)u'∂p∂x∂ Ra θsinφ, z∂θ∂ ∂p∂y'Ra θcosφ, w'∂p∂ ∂2θ∂ ∂2θ∂∂θ∂∂θ∂∂θ∂y2'∂2θ∂222z. The main stream is given ψ Ra1/2 x1/2 f (η), θ θ (η), where u ψy, according to ψx functions f (η) η and θ (η) are currently defined by f (η) functions and θ (η) satisfy equations,(17)f'gsinφ, g 12fg η→∞→'0, f(0), g(0) Denoting the main flow by superscript B, linear equations for perturbations to this thread:(18b, c, d)u'∂p∂x θsinφ, ∂p∂y θcosφ, w'∂p∂z, (18e)u'∂θB∂x∂θB∂y'ub∂θ∂x'b∂θ∂y∂2θ∂x2'∂2θ∂y2'∂2θ∂z2. Assuming that z o (y) - O (Ra'1/2), when x and O(1), see expression (16), and taking θ to be O(1), since it is a homogeneous system, we now begin to search for scaling for other variables. A clear equation (18a) indicates that the value of you is no more O (v Ra1/2), where the value v must be found. As w and pz balance in the equation (18d), so do v and py in the equation (18c). However, from the equation (18c), v should be at least the magnitude of O(Ra), given the size of the term temperature. In turn, this means that the value of the term υθyB in the equation (18e) is O(Ra3/2), which is asymptically larger than all the other terms in this equation. Apart from the term streamwise diffusion, which is O(1), the other O(Ra) in size. Thus, this formulation seems to be contradictory, since no term can be asymptomatic more than everyone else in the equation. There is a solution to this problem, which involves the introduction of a thin sublayer into the main boundary layer, but this will be discussed later. Why then does Method 1 seem to succeed in providing what looks like a good stability analysis when a strict method 2 (when applied naively) clearly doesn't? The simple answer to this question is that Method 1 calculates the value for Rax and therefore the required requirement for approximation that Rax ≫ 1, is over-ruled. Indeed, a severe imbalance in the size of terms in the equation (18e) is ignored in Chan and Chang, where the term in their analysis, which is equivalent to the current alarming term, is clearly multiplied by Rax1/2 (see equation (42) in 5). Thus, if Method 1 is seen as as rigorous asymptomatic analysis as Rax → ∞, then presenting the results as the final values of Rax means that the method is incompatible. Stability analysis using Method 3 is subject to the same difficulties as Method 1. Using the coordinates x as an arbitrarily large parameter makes it difficult to formulate this type of analysis, but the end values x are still calculated. In Method 3, it is easier to hide the fact that x is asymptically large. For similar threads, these values will be the same as rax cos φ using Method 1. However, Method 3 is the best way to attempt numerical modeling of all nonlinear equations where the boundary level approximation was not caused. So far, then, the picture that was painted is a somewhat depressing one. None of the methods used to produce both boundary-layer and linear perturbation fare equations are particularly good. Method 2 is the most reliable method for calculating the base flow, but a simple linear stability analysis, as stated above, seems incompatible. Methods 1 and 3 can produce good results for the baseline flow, but you need to take care of implementing them. However, when analyzing the stability of the order of magnitude is often not used sequentially using method 1, and method 3 can only be used with ease when the main flow itself is similar. An alternative and perfectly reasonable view of Method 1 stability analysis is that Rax should not be seen formally as a large parameter, but rather that a large base Rax thread is only used as an approximation to the thread at the final Rax value. This means that there is no discrepancy in the calculation of Rax's ultimate value in this stability analysis. The accuracy of the stability criterion obtained depends on (a) how well the boundary layer solution is approaching the exact solution, and (b) on the consequences of ignoring flow diffusion in the equations of the violation. With this if you know, the next step is to review the method 1 stability analysis that are contained in the literature. Susan Friedlander, Alexander Lipton-Lifshitz, in the Handbook of Mathematical Fluid Dynamics, 2003In contrast to the paucity of examples we possess, showing the existence of unstable discrete egenwalu, there are many examples corresponding to a slightly different type of instability, namely the instability of localized disturbances, which can be considered as high-frequency waves. Asymptomatic methods for investigating such instability geometric optics in the theory of light rays. It is widely believed that such short-wave instability is the reason for the transition from large-scale coherent structures to 3D spatial chaos; (cf. review of Bayly et al. and links to it). In order to describe such instability, you can use solutions with complex time dependence. The idea of using these solutions in hydrodynamic stability dates back to Kelvin and Orra. For many years, this idea received little attention until geometric optics were introduced into the study of compressed liquids by F.G. Friedlander in 1958 and Ludwig (131) in 1960. Later, Eckhoff (41.42) and Ekhoff and Storesletten (44, 45) studied the stability of asymutal haircuts and more common symmetrical hyperbolic systems, using a generalized progressive wave expansion approach. Eckhoff showed that local instability problems for hyperbolic systems can be significantly reduced to local analysis involving ODEs. We note that Euler's irrepressible linear equations (18) do not form a strictly hyperbolic system and Eckhoff's results cannot be directly applied to these equations. Crake and the Criminal. Crake, Crake, and Allen, Forster, and Crake revised Kelvin's ideas for Euler's unstoppable equations and demonstrated the instability associated with the special precise solutions to these equations. The general localized instability of this type is known as broadband instability. They were used by Bayly to confirm Pierrehumbert's numerical results describing the behavior of two-dimensional streams with elliptical optimization. A similar technique was used by Lagnado et al. to investigate the stability of hyperbolic flow. In the Manual of Geophysical Research: Seismic Studies, 2003Deexprification of the wave equation to a heterogeneous case, consider the equation (6.51), namely: (6.61)∇2u (x,t) 1'2∂2u (x,t)∂t2'0, which is valid for a homogeneous continum with a constant spread of the velocity. In order to extend this equation to a heterogeneous continuum, we want to express as a function of position coordinates, x. Therefore, we would like to consider the equation, (6.62) ∇2u (x,t)1'(x) 2∂2u (x,t)∂t2'0.Since the equation (6.62) is a differential equation, it corresponds to the local properties of the continuum and can be locally decided for this x. We can also get an approximate global equation solution (6,62) Assuming that function No (x) changes slowly, which means that the heterogeneity of the continuum is weak. In a seismological context, weak heterogeneity means that property changes within the same wavelength are insignificant. To formulate a trial solution to the equation (6.62), let's look at that what we can write to write solving the equation (6.61) as (6.63) u (x,t) Aexp'i (p'x't) where A is the amplitude of displacement. As stated in section 6.6.2, exp is a phase factor that is constant for the wave during t. In the three-dimensional continuum, the trial solution (6.63) is called a flat-wave solution, because during this time t, p x t is a plane that corresponds to the moving wave front. Vector p is normal for this plane and, as shown in section 6.6.2, p is a vector of phase slowness. If the properties of the three-dimensional continuum vary depending on the position, the planar wave front is distorted during the spread through this continuum. Therefore, the trial solution of the equation (6.62) should take into account these changes in the shape of the wave line, which also cause changes in the amplitude along the wave line. Using a form similar to the expression (6.63), we can write (6.64)u (x,t)-A(x)exp'i'ψ (x) x) denotes a displacement amplitude that can vary along a wave, and Ψ (x), called the econal function, explains the distortion of the shape of the wave line. In this case, both A (x) and Ψ (x) are smooth scale functions of position coordinates. Note that the expression (6.64) is a zero-order term asymptotic series given 6 u/x,t)-∑n'0Nun (x) (i)nexp'i'ψ (x)-t,where A(x) - u0 (X).7 Thus, the following results relate to the area of asymptomatic methods that play an important role in seismology. In this book, however, we do not directly discuss the theory of rays in the context of asymptomatic methods. By studying the phase factor of the trial solution (6.64) in the context of solutions (6.56) and (6.63), we see that the ψ (x) t equation represents a moving wave front. In other words, Ψ x) feature levels are a wave front. Since the p is normal for the wave front, using the properties of the gradient, we get an important expression, namely, the vector of phase slowness is the gradient of the econal function. Now we insert a trial solution (6.64) into the equation (6.62). Taking into account the Laplace x1 component and replacing the appropriate trial form (6.64), we get ∂2∂x12A (x1) exp'i'ψ (x1 ψ ψ (x1) ∂2A∂x12∂2∂A∂x1∂ψ∂x1∂ψ∂∂2ψ∂x1∂ψ2. Taking into account the second derivative in relation to time and replacing the same form of trial solution, we get ∂2∂t2A (x1 ψ) exp'i'ψ (x1) Hence, given the fact that the exponential term is never zero, the corresponding form of the equation (6.62) becomes (6.66)∂2A∂x12'A'2 (1'2∂ψ∂x1∂ψ∂x1) 2∂A∂x1∂ψ∂x1∂zψ∂x12∂zψ∂0, which is a complex function of real-world variables. The disappearance of the expression (6.66), where both A and Ψ are considered real, implies both real and imaginary parts. Assuming ≠ 0, we get a system of two equations, (6.67) ∂2A∂x12'A2 (1'2∂ψ∂x1∂ψ∂x1) 02∂2A∂x12∂ψ∂x1A∂2ψ∂x12'0. Considering 3D, incontinence and following the definitions of the Laplace operator and operator, we can write the system (6.67) as (6.68) ∇2A-A2'2'2 (x) (∇ψ)2'02∇ APC ∇ψ∇2ψ 0, where (∇Ψ)2 : (∂Ψ/∂x1)2 (∂Ψ/∂x2)2 (∂Ψ/∂x3)2. The system (6.68) corresponds to the equation (6.62) in the context of the trial solution (6.64). The system (6.68) is no easier than the equation (6.62). However, further analysis of the first equation of this system leads to simplification and leads to the ekonal equation. The second equation of the system (6.68) is called the transport equation. In Wave Fields in Real Media (Third Edition), the 2015 Direct methods discussed in this chapter (the ultimate difference, pseudospectral methods and end-element techniques) do not impose restrictions on the type of tension and tension relationship, border conditions or source type. They also allow for overall variability in the material. For example, a numerical solution to the spread of waves in an anisotropic pig-beautiful environment suitable for reservoir environments is not particularly difficult compared to simple cases, such as the acoustic wave equation describing the spread of dilatal waves. Many complex voltage relationships, processed by direct methods, cannot be solved by integral equations or asymptomatic methods without simplification of assumptions. However, direct methods for solving these equations are certainly more expensive in terms of computer time and storage. The ultimate differences are simple in the program and effective compared to alternative methods, with fairly soft accuracy requirements. In this sense, a good choice can be the second order in time, the fourth order in the FD space algorithm. Pseudospectral methods may be more expensive in some cases, but guarantee higher accuracy and relatively lower background noise when using stepped differential operators. These operators are also suitable when there are large fluctuations in the Poisson ratio (e.g. liquid/solid interface). In three dimensions, pseudospectral methods require minimum grid points, compared to the final differences, and may be the best choice when limited computer storage is available. However, if a dense mesh is needed for physical reasons (e.g. thin layering, heterogeneity scattering, etc.), the FD algorithm may be more convenient. Without a doubt, the best algorithm for modeling surface topography and curved interfaces is the method of the final element. Using spectral interpolators, this algorithm can compete with earlier methods in terms of accuracy and stability. However, this approach may be unstable Ratio. The end-element methods are best suited for engineering tasks, where interfaces have clearly defined geometric features, as opposed to geological interfaces. In addition, grid models are not required intensively, as is the case in seismic inversion algorithms. The use of non-rectangular grids, mainly in 3D space, is one of the main drawbacks of the end-element methods due to topological problems that need to be addressed when building a model. The final elements of the methods, however, are preferable to seismic problems associated with the spread of surface waves in situations of complex topography.J. Tromp, in the Treatise on Geophysics (Second Edition), 2015Synthetic seismograms are at the center of modern global seismology. For spherically symmetrical, i.e. one-dimensional (1D) models of the Earth, summation in normal mode is the preferred method of calculating broadband seismograms (e.g. Dalen and Tromp, 1998; Gilbert, 1970). Normal mode synthetics include effects due to solid fluid borders, transverse isotropy with axis of radial symmetry and time. Synthetic mode is often used as reference seismograms, for example, to make cross-correlational measurements of time in the body-wave path or to characterize the fundamental surface-wave variance of Love and Reilly. Before fully 3D numerical methods became available and practical, it was necessary to resort to asymptomatic methods for calculating synthetic seismograms. Numerous asymptomatic methods have been and continue to evolve over the years. For example, in the approach of a medium or large circle (e.g., Nolet, 1990; Woodhouse and Dzevonski, 1984), it is assumed that a seismogram can be calculated on the basis of the spherically symmetrical model of the Earth, characteristic of a particular combination of the source-receiver. In the reverse theory, this approximate change in wave shape is associated with a change in the Earth model using a 1D freche nucleus or sensitivity. By asymptotically accounting for the connection mode, Lee and Tanimoto (1993) expanded the path of the average method to obtain 2D sensitivity to the structure in the source-receiver plane. In this approach, wavelength changes are associated with model changes using the 2D sensitivity nucleus (Li and Romanowicz, 1995, 1996; Markering and Snyder, 1995, 1996). Currently, seismologists fully calculate 3D synthetic seismograms on the scale of the globe, and the relationship between waveforms and the structure of the Earth is expressed in terms of nuclei 3D sensitivity. The calculation of such nuclei for spherically symmetrical reference models can be made on the basis of the summation of the regime (Marquering et al., 1998; zhao, etc., 2000) or the theory of rays (Dahlen et al., 2000; Hung et al., 2000; Montelli et al., 2004), For 3D models, such calculations include the use of so-called abut simulations (e.g. (e.g. Et. 2002, 2003; Talagrand and Courtier, 1987; Tarantola, 1984; Tromp et al., 2005). The number of numerical methods that can handle the spread of seismic waves in 3D models of the Earth accurately is quite limited. All classical numerical methods have been used, for example, the ultimate difference method (FDM) and the pseudo-spectral method (PM), but so far these methods have been limited to either parts of the globe, i.e. limited in terms of the size of the simulation area (e.g., Furumura et al., 1998, 1999; Igel, 1999; Wang et al., 2001), or to pure haircut/acoustic problems, i.e. including only sl./compression waves (e.g., Igel and Weber, 1995; Thomas et al., 2000). Numerical modeling, based on complex or weak implementations of the motion equation, was most successful in capturing the complexity of the Earth's global models. Joint Mode Methods (CMM), in which Earth's 3D model modes are summed up by the modes of the spherically symmetrical reference model of the Earth (e.g., Capdeville et al., 2000; Lognonne and Romanovich, 1990; Park, 1986; Park and Yu, 1992), or Direct Solution Methods (DSMs), which use more general basic functions (e.g. Geller and Ohminato, 1994; Hara et al., 1991; Takeuchi et al., 2000), capable of calculating synthetic seismograms in 3D models of the Earth in relatively long periods of time. To date, the most successful numerical method of modeling the global spread of seismic waves is the Method of Spectral Elements (SEM) (Chaljub, 2000; Chaljub et al., 2003; Komatic and Tromp, 2002a.b; Komatitsch et al., 2002, 2003). See Komatitsch et al (2005) and Chaljub et al (2007) for detailed recent reviews of the method. Like the CMM, DSM and finite element (FEM) method, SEM is based on a holistic or weak implementation of the motion equation. It combines the precision of global PM with the flexibility of FEM. The wave field is usually presented in terms of the high degree of Lagrange interpolants, and the integrals are calculated based on the Gauss-Lobatto-Legendre (GLL) quadratic (GLL) quadratic, resulting in a simple clear time diagram that lends itself very well to calculations on parallel computers. Capdeville et al. (2003a,b) demonstrated how the computational burden associated with SEM can be reduced by connecting it to a solution as usual. This reduces the cost of the method by assuming a spherically symmetrical solution in the part of the Earth, such as the nucleus, using spectral elements only in the rest of the model, such as the mantle. The purpose of this chapter is to introduce and review the various numerical methods used in global seismology to create synthetic seismograms in Earth's 3D models. We begin by setting the task of simulating the global spread of seismic waves. Then we introduce an elastic wave which forms the basis of all numerical simulations of the spread of seismic waves. We discuss the basic boundary conditions that arise in the models of the Earth with a free surface and various internal solid and liquid ruptures. Complications due to anisotropy, fading and self-recording are important in the context of the spread of seismic waves, but for the sake of simplicity these effects are discussed only peripherally. We distinguish numerical methods based on the movement equation in its differential form, subject to certain boundary conditions, called differential or strong implementations, such as FDM and PM, and numerical methods based on the complex or weak implementation of the motion equation, which contains border conditions implicitly, such as SMM, DSM, FEM and SEM. In conclusion, we will discuss the possibility of using 3D numerical modeling to solve the reverse problem. We will take on the basic knowledge of tensor notation and algebra. Algebra. financial planning file note example. financial planning file note template. financial planning file notes. client file checklist financial planning. first appointment file note financial planning. financial planning client files. financial planning pdf file. financial planning excel file