Deformation Theory

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Introduction to Singularities and Deformations - Gert-Martin Greuel 2007-02-23 Singularity theory is a young, rapidly-growing topic with connections to algebraic geometry, complex analysis, commutative algebra, representations theory, Lie groups theory and topology, and many applications in the natural and technical sciences. This book presents the basic singularity theory of analytic spaces, including local deformation theory and the theory of plane curve singularities. It includes complete proofs.
Deformation Theory and Quantum Groups with Applications to

Mathematical Physics - Murray Gerstenhaber 1992 Quantum groups are not groups at all, but special kinds of Hopf algebras of which the most important are closely related to Lie groups and play a central role in the statistical and wave mechanics of Baxter and Yang. Those occurring physically can be studied as essentially algebraic and closely related to the deformation theory of algebras (commutative, Lie, Hopf, and so on). One of the oldest forms of algebraic quantization amounts to the study of deformations of a commutative algebra A (of classical observables) to a noncommutative algebra A_h (of operators) with the infinitesimal deformation given by a Poisson bracket on the original algebra A. This volume grew out of an AMS-IMS-SIAM Joint Summer Research Conference, held in June 1990 at the University of Massachusetts at Amherst. The conference brought together leading researchers in the several areas mentioned and in areas such as ``q special functions'', which have their origins in the last century but whose relevance to modern physics has only recently been understood. Among the advances taking place during the conference was Majid's reconstruction theorem for Drinfeld's quasi-Hopf algebras. Readers will appreciate this snapshot of some of the latest developments in the mathematics of quantum groups and deformation theory.

Operads in Deformation Theory - Rogier David Bos 2001

Deformation Theory of Discontinuous Groups - Ali Baklouti 2022-06-20
This book contains the latest developments of the theory of discontinuous groups acting on solvable homogenous spaces, from basic concepts to a comprehensive exposition, and the newest approaches and methods in deformation theory. It presents proofs of recent results, computes fundamental examples, and serves as an introduction and reference for students and researchers in Lie theory, discontinuous groups, and deformation (and moduli) spaces.
Kodaira-Spencer Maps in Local Algebra - Bernd Herzog 2006-11-14
The monograph contributes to Lech's inequality - a 30-year-old problem of commutative algebra, originating in the work of Serre and Nagata, that relates the Hilbert function of the total space of an algebraic or analytic deformation germ to the Hilbert function of the parameter space. A weakened version of Lech's inequality is proved using a construction that can be considered as a local analog of the Kodaira-Spencer map known from the deformation theory of compact complex manifolds. The methods are quite elementary, and will be of interest for researchers in deformation theory, local singularities and Hilbert functions.
Lie Methods in Deformation Theory - Marco Manetti 2022-08-01
This book furnishes a comprehensive treatment of differential graded Lie algebras, L-infinity algebras, and their use in deformation theory. We believe it is the

first textbook devoted to this subject, although the first chapters are also covered in other sources with a different perspective. Deformation theory is an important subject in algebra and algebraic geometry, with an origin that dates back to Kodaira, Spencer, Kuranishi, Gerstenhaber, and Grothendieck. In the last 30 years, a new approach, based on ideas from rational homotopy theory, has made it possible not only to solve long-standing open problems, but also to clarify the general theory and to relate apparently different features. This approach works over a field of characteristic 0, and the central role is played by the notions of differential graded Lie algebra, L-infinity algebra, and Maurer–Cartan equations. The book is written keeping in mind graduate students with a basic knowledge of homological algebra and complex algebraic geometry as utilized, for instance, in the book by K. Kodaira, Complex Manifolds and Deformation of Complex Structures. Although the main applications in this book concern deformation theory of complex manifolds, vector bundles, and holomorphic maps, the underlying algebraic theory also applies to a wider class of deformation problems, and it is a prerequisite for anyone interested in derived deformation theory. Researchers in algebra, algebraic geometry, algebraic topology, deformation theory, and noncommutative geometry are the major targets for the book.

Unified Constitutive

Laws of Plastic Deformation - A. S. Krausz 1996-05-31
High-technology industries using plastic deformation demand soundly-based economical decisions in manufacturing design and product testing, and the unified constitutive laws of plastic deformation give researchers aguideline to use in making these decisions. This book provides extensive guidance in low cost manufacturing without the loss of product quality. Each highly detailed chapter of Unified Constitutive Laws of Plastic Deformation focuses on a distinct set of defining equations. Topics covered include anisotropic and viscoplastic flow, and the overall kinetics and thermodynamics of deformation. This important book deals with a prime topic in materials science and engineering, and will be of great use toboth researchers and graduate students. Describes the theory and applications of the constitutive law of plastic deformation for materials testing Examines the constitutive law of plastic deformation as it applies to process and product design Includes a program on disk for the determination and development of the constitutive law of plastic deformation Considers economical design and testing methods
Deformation Theory and Local-Global Compatibility of Langlands Correspondences - Martin Luu 2015-10-27
The deformation theory of automorphic representations is used to study local

properties of Galois representations associated to automorphic representations of general linear groups and symplectic groups. In some cases this allows to identify the local Galois representations with representations predicted by a local Langlands correspondence.

Algebraic deformation theory - FIALOWSKI ALICE. 2008

Shear Deformable Beams and Plates - C.M. Wang 2000-07-19

Most books on the theory and analysis of beams and plates deal with the classical (Euler-Bernoulli/Kirchoff) theories but few include shear deformation theories in detail. The classical beam/plate theory is not adequate in providing accurate bending, buckling, and vibration results when the thickness-to-length ratio of the beam/plate is relatively large. This is because the effect of transverse shear strains, neglected in the classical theory, becomes significant in deep beams and thick plates. This book illustrates how shear deformation theories provide accurate solutions compared to the classical theory. Equations governing shear deformation theories are typically more complicated than those of the classical theory. Hence it is desirable to have exact relationships between solutions of the classical theory and shear deformation theories so that whenever classical theory solutions are available, the corresponding solutions of shear deformation theories can be readily

obtained. Such relationships not only furnish benchmark solutions of shear deformation theories but also provide insight into the significance of shear deformation on the response. The relationships for beams and plates have been developed by many authors over the last several years. The goal of this monograph is to bring together these relationships for beams and plates in a single volume. The book is divided into two parts. Following the introduction, Part 1 consists of Chapters 2 to 5 dealing with beams, and Part 2 consists of Chapters 6 to 13 covering plates. Problems are included at the end of each chapter to use, extend, and develop new relationships.

The Isomonodromic Deformation Method in the Theory of Painleve Equations - Alexander R. Its 2006-11-14

Elastoplasticity Theory - Vlado A. Lubarda 2001-07-16

Understanding the elastoplastic deformation of metals and geomaterials, including the constitutive description of the materials and analysis of structure undergoing plastic deformation, is an essential part of the background required by mechanical, civil, and geotechnical engineers as well as materials scientists. However, most books address the subject at a introductory level and within the infinitesimal strain context. Elastoplasticity Theory takes a different approach in an advanced treatment presented entirely within the framework of finite

deformation. This comprehensive, self-contained text includes an introduction to nonlinear continuum mechanics and nonlinear elasticity. In addition to in-depth analysis of the mathematical and physical theories of plasticity, it furnishes an up-to-date look at contemporary topics, such as plastic stability and localization, monocrystalline plasticity, micro-to-macro transition, and polycrysalline plasticity models. Elastoplasticity Theory reflects recent trends and advances made in the theory of plasticity over the last four decades. It will not only help stimulate further research in the field, but will enable its readers to confidently select the appropriate constitutive models for the materials or structural members relevant to their own applications.

Algebraic and Analytic Deformation Theory - William Stephen Piper 1966

Homotopy Equivalences of 3-Manifolds and Deformation Theory of Kleinian Groups - Richard Douglas Canary 2004

Three volume narrative history of 20th century.

Deformations of Singularities - Jan Stevens 2003-07-03

These notes deal with deformation theory of complex analytic singularities and related objects. The first part treats general theory. The central notion is that of versal deformation in several variants. The theory is developed both in an abstract way and in a concrete way suitable for computations. The second

part deals with more specific problems, specially on curves and surfaces. Smoothings of singularities are the main concern. Examples are spread throughout the text.

A Study in Derived Algebraic Geometry - Dennis Gaitsgory 2020-10-07

Derived algebraic geometry is a far-reaching generalization of algebraic geometry. It has found numerous applications in other parts of mathematics, most prominently in representation theory. This volume develops deformation theory, Lie theory and the theory of algebroids in the context of derived algebraic geometry. To that end, it introduces the notion of inf-scheme, which is an infinitesimal deformation of a scheme and studies ind-coherent sheaves on such. As an application of the general theory, the six-functor formalism for D-modules in derived geometry is obtained. This volume consists of two parts. The first part introduces the notion of ind-scheme and extends the theory of ind-coherent sheaves to inf-schemes, obtaining the theory of D-modules as an application. The second part establishes the equivalence between formal Lie group(oids) and Lie algebr(oids) in the category of ind-coherent sheaves. This equivalence gives a vast generalization of the equivalence between Lie algebras and formal moduli problems. This theory is applied to study natural filtrations in formal derived geometry generalizing the Hodge filtration.

Noncommutative Deformation Theory - Eivind Eriksen

2017-09-19
Noncommutative Deformation Theory is aimed at mathematicians and physicists studying the local structure of moduli spaces in algebraic geometry. This book introduces a general theory of noncommutative deformations, with applications to the study of moduli spaces of representations of associative algebras and to quantum theory in physics. An essential part of this theory is the study of obstructions of liftings of representations using generalised (matric) Massey products. Suitable for researchers in algebraic geometry and mathematical physics interested in the workings of noncommutative algebraic geometry, it may also be useful for advanced graduate students in these fields.

Several Complex Variables IV - Semen G. Gindikin 2012-12-06
This volume of the EMS contains four survey articles on analytic spaces. They are excellent introductions to each respective area. Starting from basic principles in several complex variables each article stretches out to current trends in research. Graduate students and researchers will find a useful addition in the extensive bibliography at the end of each article.

Deformations of Algebraic Schemes - Edoardo Sernesi 2007-04-20
This account of deformation theory in classical algebraic geometry over an algebraically closed field presents for the first time some results previously scattered in the literature, with

proofs that are relatively little known, yet relevant to algebraic geometers. Many examples are provided. Most of the algebraic results needed are proved. The style of exposition is kept at a level amenable to graduate students with an average background in algebraic geometry.

Deformation Theory and Symplectic Geometry - Daniel Sternheimer 1997-07-31

Proceedings of the Ascona Meeting, June 1996

Deformation Theory of Discontinuous Groups - Ali Baklouti 2022-07-05

This book contains the latest developments of the theory of discontinuous groups acting on homogenous spaces, from basic concepts to a comprehensive exposition. It develops the newest approaches and methods in the deformation theory of topological modules and unitary representations and focuses on the geometry of discontinuous groups of solvable Lie groups and their compact extensions. It also presents proofs of recent results, computes fundamental examples, and serves as an introduction and reference for students and experienced researchers in Lie theory, discontinuous groups, and deformation (and moduli) spaces.

Modular Forms and Fermat's Last Theorem - Gary Cornell 2013-12-01

This volume contains the expanded lectures given at a conference on number theory and arithmetic geometry held at Boston University. It introduces and explains the many ideas and techniques used by Wiles, and to explain how his result can be

combined with Ribets theorem and ideas of Frey and Serre to prove Fermats Last Theorem. The book begins with an overview of the complete proof, followed by several introductory chapters surveying the basic theory of elliptic curves, modular functions and curves, Galois cohomology, and finite group schemes. Representation theory, which lies at the core of the proof, is dealt with in a chapter on automorphic representations and the Langlands-Tunnell theorem, and this is followed by in-depth discussions of Serres conjectures, Galois deformations, universal deformation rings, Hecke algebras, and complete intersections. The book concludes by looking both forward and backward, reflecting on the history of the problem, while placing Wiles'theorem into a more general Diophantine context suggesting future applications. Students and professional mathematicians alike will find this an indispensable resource.

Deformation Theory of Algebras and Structures and Applications - Michiel Hazewinkel 2012-12-06

This volume is a result of a meeting which took place in June 1986 at 'll Ciocco" in Italy entitled 'Deformation theory of algebras and structures and applications'. It appears somewhat later than is perhaps desirable for a volume resulting from a summer school. In return it contains a good many results which were not yet available at the time of the meeting. In particular it is now abundantly clear that the Deformation theory

of algebras is indeed central to the whole philosophy of deformations/perturbations/stability. This is one of the main results of the 254 page paper below (practically a book in itself) by Gerstenhaber and Shack entitled "Algebraic cohomology and defor mation theory". Two of the main philosphical-methodological pillars on which deformation theory rests are the fol lowing • (Pure) To study a highly complicated object, it is fruitful to study the ways in which it can arise as a limit of a family of simpler objects: "the unraveling of complicated structures" . • (Applied) If a mathematical model is to be applied to the real world there will usually be such things as coefficients which are imperfectly known. Thus it is important to know how the behaviour of a model changes as it is perturbed (deformed). *Deformation Theory of Plasticity* - Robert Millard Jones 2009

Plasticity Theory - Jacob Lubliner 2013-04-22
The aim of Plasticity Theory is to provide a comprehensive introduction to the contemporary state of knowledge in basic plasticity theory and to its applications. It treats several areas not commonly found between the covers of a single book: the physics of plasticity, constitutive theory, dynamic plasticity, large-deformation plasticity, and numerical methods, in addition to a representative survey of problems treated by classical methods, such as elastic-plastic problems, plane plastic flow, and limit

analysis; the problem discussed come from areas of interest to mechanical, structural, and geotechnical engineers, metallurgists and others. The necessary mathematics and basic mechanics and thermodynamics are covered in an introductory chapter, making the book a self-contained text suitable for advanced undergraduates and graduate students, as well as a reference for practitioners of solid mechanics.

Lectures on Chern-Weil Theory and Witten Deformations - Weiping Zhang 2001

This invaluable book is based on the notes of a graduate course on differential geometry which the author gave at the Nankai Institute of Mathematics. It consists of two parts: the first part contains an introduction to the geometric theory of characteristic classes due to ShiingOCoshen Chern and Andr(r) Weil, as well as a proof of the GaussOCoBonnetOCoChern theorem based on the MathaiOCoQuillen construction of Thom forms; the second part presents analytic proofs of the Poincar(r)OCoHopf index formula, as well as the Morse inequalities based on deformations introduced by Edward Witten. Contents: ChernOCoWeil Theory for Characteristic Classes; Bott and DuistermaatOCoHeckman Formulas; GaussOCoBonnetOCoChern Theorem; Poincar(r)OCoHopf Index Formula: An Analytic Proof; Morse Inequalities: An Analytic Proof; ThomOCoSmale and Witten Complexes; Atiyah Theorem on Kervaire

Semi-characteristic. Readership: Graduate students and researchers in differential geometry, topology and mathematical physics."

Mathematical Modeling of Inelastic Deformation - J.F. Besseling 1994-05-15

Mathematical Modeling of Inelastic Deformation details the mathematical modeling of the inelastic behavior of engineering materials. The authors use a thermodynamic approach to the subject and focus on crystalline materials, but not to the exclusion of macro-moleular solids. Within a unified theory for small and large deformations, they develop simple models, such as the elastic-perfectly plastic model, as well as complex models dealing with anisotropic hardening. The book includes finite element implementation of the theory and illustrates the implementation with examples from heat production and conduction processes.

Deformation Theory and the Fundamental Group in Algebraic Geometry - David Harbater 1978

Elliptic Curves, Hilbert Modular Forms and Galois Deformations - Laurent Berger 2013-06-13

The notes in this volume correspond to advanced courses held at the Centre de Recerca Matemàtica as part of the research program in Arithmetic Geometry in the 2009-2010 academic year. The notes by Laurent Berger provide an introduction to p-adic Galois representations and Fontaine rings, which are especially useful for describing many local deformation rings at p that arise naturally in Galois

deformation theory. The notes by Gebhard Böckle offer a comprehensive course on Galois deformation theory, starting from the foundational results of Mazur and discussing in detail the theory of pseudo-representations and their deformations, local deformations at places $l \neq p$ and local deformations at p which are flat. In the last section,the results of Böckle and Kisin on presentations of global deformation rings over local ones are discussed. The notes by Mladen Dimitrov present the basics of the arithmetic theory of Hilbert modular forms and varieties, with an emphasis on the study of the images of the attached Galois representations, on modularity lifting theorems over totally real number fields, and on the cohomology of Hilbert modular varieties with integral coefficients. The notes by Lassina Dembélé and John Voight describe methods for performing explicit computations in spaces of Hilbert modular forms. These methods depend on the Jacquet-Langlands correspondence and on computations in spaces of quaternionic modular forms, both for the case of definite and indefinite quaternion algebras. Several examples are given, and applications to modularity of Galois representations are discussed. The notes by Tim Dokchitser describe the proof, obtained by the author in a joint project with Vladimir Dokchitser, of the parity conjecture for elliptic curves over number fields under the assumption of finiteness of the Tate-Shafarevich group. The statement of

the Birch and Swinnerton-Dyer conjecture is included, as well as a detailed study of local and global root numbers of elliptic curves and their classification.
Deformation Theory of Complex Manifolds - Alfred Frölicher 1959

Analytical Surface Deformation Theory - Yüksel Altiner 2013-04-18
Due to plate motions, tidal effects of the Moon and the Sun, atmosphe ric, hydrological, ocean loading and local geological processes, and due to the rotation of the Earth, all points on the Earth's crust are sub ject to deformation. Global plate motion models, based on the ocean floor spreading rates, transform fault azimuths, and earthquake slip vectors, describe average plate motions for a time period of the past few million years. Therefore, the investigation of present-day tectonic activities by global plate motion models in a small area with complex movements cannot supply satisfactory results. The contribution of space techniques [Very Long Baseline Interferome try (VLBI); Satellite Laser Ranging (SLR); Global Positioning System (GPS)] applied to the present-day deformations ofthe Earth's surface and plate tectonics has increased during the last 20 to 25 years. Today one is able to determine by these methods the relative motions in the em to sub-em-range between points far away from each other.
Lie Methods in Deformation Theory - Marco Manetti 2022-09-01
This book furnishes a

comprehensive treatment of differential graded Lie algebras, L-infinity algebras, and their use in deformation theory. We believe it is the first textbook devoted to this subject, although the first chapters are also covered in other sources with a different perspective. Deformation theory is an important subject in algebra and algebraic geometry, with an origin that dates back to Kodaira, Spencer, Kuranishi, Gerstenhaber, and Grothendieck. In the last 30 years, a new approach, based on ideas from rational homotopy theory, has made it possible not only to solve long-standing open problems, but also to clarify the general theory and to relate apparently different features. This approach works over a field of characteristic 0, and the central role is played by the notions of differential graded Lie algebra, L-infinity algebra, and Maurer–Cartan equations. The book is written keeping in mind graduate students with a basic knowledge of homological algebra and complex algebraic geometry as utilized, for instance, in the book by K. Kodaira, Complex Manifolds and Deformation of Complex Structures. Although the main applications in this book concern deformation theory of complex manifolds, vector bundles, and holomorphic maps, the underlying algebraic theory also applies to a wider class of deformation problems, and it is a prerequisite for anyone interested in derived deformation theory. Researchers in algebra, algebraic geometry, algebraic

topology, deformation theory, and noncommutative geometry are the major targets for the book.

Deformation Theory of Pseudogroup Structures - Victor Guillemin 1966

Image Correlation for Shape, Motion and Deformation Measurements - Michael A. Sutton 2009-04-21

Image Correlation for Shape, Motion and Deformation Measurements provides a comprehensive overview of data extraction through image analysis. Readers will find and in-depth look into various single- and multi-camera models (2D-DIC and 3D-DIC), two- and three-dimensional computer vision, and volumetric digital image correlation (VDIC). Fundamentals of accurate image matching are described, along with presentations of both new methods for quantitative error estimates in correlation-based motion measurements, and the effect of out-of-plane motion on 2D measurements. Thorough appendices offer descriptions of continuum mechanics formulations, methods for local surface strain estimation and non-linear optimization, as well as terminology in statistics and probability. With equal treatment of computer vision fundamentals and techniques for practical applications, this volume is both a reference for academic and industry-based researchers and engineers, as well as a valuable companion text for appropriate vision-based educational offerings.

From Classical Field Theory to Perturbative Quantum Field Theory - Michael Dütsch

2019-03-18
This book develops a novel approach to perturbative quantum field theory: starting with a perturbative formulation of classical field theory, quantization is achieved by means of deformation quantization of the underlying free theory and by applying the principle that as much of the classical structure as possible should be maintained. The resulting formulation of perturbative quantum field theory is a version of the Epstein-Glaser renormalization that is conceptually clear, mathematically rigorous and pragmatically useful for physicists. The connection to traditional formulations of perturbative quantum field theory is also elaborated on, and the formalism is illustrated in a wealth of examples and exercises.

Complex Manifolds and Deformation of Complex Structures - K. Kodaira 2012-12-06
This book is an introduction to the theory of complex manifolds and their deformations. Deformation of the complex structure of Riemann surfaces is an idea which goes back to Riemann who, in his famous memoir on Abelian functions published in 1857, calculated the number of effective parameters on which the deformation depends. Since the publication of Riemann's memoir, questions concerning the deformation of the complex structure of Riemann surfaces have never lost their interest. The deformation of algebraic surfaces seems to have been considered first by Max Noether in 1888 (M.

Noether: Anzahl der Modulen einer Classe algebraischer Fliichen, Sitz. K6niglich. Preuss. Akad. der Wiss. zu Berlin, erster Halbband, 1888, pp. 123-127). However, the deformation of higher dimensional complex manifolds had been curiously neglected for 100 years. In 1957, exactly 100 years after Riemann's memoir, Frolicher and Nijenhuis published a paper in which they studied deformation of higher dimensional complex manifolds by a differential geometric method and obtained an important result. (A. Fr61icher and A. Nijenhuis: A theorem on stability of complex structures, Proc. Nat. Acad. Sci., U.S.A., 43 (1957), 239-241).

Deformation Spaces - Hossein Abbaspour 2010-04-21

The first instances of deformation theory were given by Kodaira and Spencer for complex structures and by Gerstenhaber for associative algebras. Since then, deformation theory has been applied as a useful tool in the study of many other mathematical structures, and even today it plays an important role in many developments of modern mathematics. This volume collects a few self-contained and peer-reviewed papers by experts which present up-to-date research topics in algebraic and motivic topology, quantum field theory, algebraic geometry, noncommutative geometry and the deformation theory of Poisson algebras. They originate from activities at the Max-Planck-Institute for Mathematics and the Hausdorff Center for Mathematics in Bonn.

Earthquake and Volcano Deformation - Paul

Segall 2010-01-04 Earthquake and Volcano Deformation is the first textbook to present the mechanical models of earthquake and volcanic processes, emphasizing earth-surface deformations that can be compared with observations from Global Positioning System (GPS) receivers, Interferometric Radar (InSAR), and borehole strain- and tiltmeters. Paul Segall provides the physical and mathematical fundamentals for the models used to interpret deformation measurements near active faults and volcanic centers. Segall highlights analytical methods of continuum mechanics applied to problems of active crustal deformation. Topics include elastic dislocation theory in homogeneous and layered half-spaces, crack models of faults and planar intrusions, elastic fields due to pressurized spherical and ellipsoidal magma chambers, time-dependent deformation resulting from faulting in an elastic layer overlying a viscoelastic half-space and related earthquake cycle models, poroelastic effects due to faulting and magma chamber inflation in a fluid-saturated crust, and the effects of gravity on deformation. He also explains changes in the gravitational field due to faulting and magmatic intrusion, effects of irregular surface topography and earth curvature, and modern concepts in rate- and state-dependent fault friction. This textbook presents sample calculations and compares model predictions against field data from seismic and volcanic settings from around the world.

Earthquake and Volcano Deformation requires working knowledge of stress and strain, and advanced calculus. It is appropriate for advanced undergraduates and graduate students in geophysics, geology, and engineering. Professors: A supplementary Instructor's Manual is available for this book. It is restricted to teachers using the text in courses. For information on how to obtain a copy, refer to: http://press.princeton.edu/class_use/solutions.html

Deformation Theory - Robin Hartshorne 2009-12-10

The basic problem of deformation theory in algebraic geometry involves watching a small deformation of one member of a family of objects, such as varieties, or subschemes in a fixed space, or vector bundles on a fixed scheme. In this new book, Robin Hartshorne studies first what happens over small infinitesimal deformations, and then gradually builds up to more global situations, using methods pioneered by Kodaira and Spencer in the complex analytic case, and adapted and expanded in algebraic geometry by Grothendieck. The author includes numerous exercises, as well as important examples illustrating various aspects of the theory. This text is based on a graduate course taught by the author at the University of California, Berkeley.

Deformation Theory of Algebras and Their Diagrams - Martin Markl 2012

This book brings together both the classical and current aspects of deformation theory. The presentation

is mostly self-contained, assuming only basic knowledge of commutative algebra, homological algebra and category theory. In the interest of readability, some technically complicated proofs have been omitted when a suitable reference was available. The relation between the uniform continuity of algebraic maps and topologized tensor products is explained in detail, however, as this subject does not seem to be commonly known and the literature is scarce. The exposition begins by recalling Gerstenhaber's classical theory for associative algebras. The focus then shifts to a homotopy-invariant setup of Maurer-Cartan moduli spaces. As an application, Kontsevich's approach to deformation quantization of Poisson manifolds is reviewed. Then, after a brief introduction to operads, a strongly homotopy Lie algebra governing deformations of (diagrams of) algebras of a given type is described, followed by examples and generalizations.