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ASME 71-MET-AA Dec 13 2021

Stress-Strain Characteristics of Materials at High Strain Rates. Part Iv. Experimental and Theoretical Analysis of Plastic Impacts on Short Cylinders Mar 16 2022 The effects of strain rate on the stress-strain characteristics of copper and lead were studied by measuring both stress and strain as functions of time using short cylindrical specimens supported at one end on a modified Hopkinson pressure bar and impacted at the other end by a steel projectile. Corresponding stresses and strains were computed according to an elementary nonstrain-rate theory (sometimes referred to as the von Karman theory) in which the dynamic stress-strain curve is assumed to be the same as the static stress- strain curve. Stresses and strains were also computed according to an elementary strain-rate theory (sometimes referred to as the Malvern theory) in which the dynamic stress may exceed the static stress for a given strain by an amount which depends upon the strain rate. It was found that the predictions of the nonstrain- rate theory agreed with measured values only for low impact velocities and for points at least two diameters from the impact end of the specimen. By proper choice of the flow or relaxation constant in the elementary strain-rate theory, measured and computed values of strain, or of stress, but not both simultaneously, could be brought into agreement. In the more general exponentialtype, strain-rate law, two independent parameters appear. Presumably with two constants to adjust, this theory could be made to correctly predict both stresses and strains for the conditions under which the tests were performed. If this procedure forces the theory to account for variations which are actually caused by lateral inertia and shear, erroneous conclusions regarding the properties of the material will be drawn. Further study of the effects of shear and lateral inentia is indicated. (auth).

stress, strain, and strength Jul 20 2022

Atlas of Stress-strain Curves Oct 23 2022

Measurements of Stress-strain, Peak Particle Velocity and Wave-propagation in Three Sands May 06 2021

Engineering Considerations of Stress, Strain, and Strength Jan 14 2022

Formulas for Stress, Strain, and Structural Matrices Sep 22 2022 Publisher Description

Dynamic Stress-strain Relations for Annealed 2s Aluminum Under Compression Impact - and Appendix Jan 22 2020 Two methods of securing a dynamic stress-strain curve are considered: namely, from the measurement of impact stress as a function of maximum plastic strain and impact stress as a function of the impact velocity. The results show that the behavior of annealed 2S Al under condition of impact loading into the plastic strain range can be represented to a good approximation by a single dynamic stress-status relation. This dynamic stress-strain relation lies above the static stress-strain curve. The excess of dynamic stress over the static values increases progressively with strain, reaching about 20% of the static stress at a strain of 4.5%. However, the 2 dynamic relations are not coincident which indicates that the behavior of the material cannot be described by a single dynamic stress-strain relation. A detailed analysis of the experimental measurements by means of the von Karman theory of propagation of plastic strains in long rods indicates that the behavior of the material near the impact surface may be described by a family of stress-strain relations. Each member of this family of curves corresponds to a given impact stress, and the curves are arranged consecutively in order of increasing impact stress. All of these curves lie within a narrow region in the stress-strain plane.

Prediction of Stress and Strain Under Drained Loading Condition Dec 01 2020

College Physics for AP® Courses Oct 31 2020 The College Physics for AP(R) Courses text is designed to engage students in their exploration of physics and help them apply these concepts to the Advanced Placement(R) test. This book is Learning List-approved for AP(R) Physics courses. The text and images in this book are grayscale.

The ZI Method and Its Application for Calculating of Stress-Strain Parameters of Structural Members Apr 24 2020 Prof. Zidonis has developed, and in this monograph introduces, an integral ZI method for theoretical calculation of each individual actual value of the stress-strain parameters (crack, the height of the compression and tension zones, the stress and strain of the layers of the structural member) at cross-sections of structural members subjected to bending moments and/or axial forces at any stage of loading directly considering the actual properties of the materials. The method helps resolve an extremely important and complicated problem, i.e that of theoretical computation of the actual position of the neutral axis. The ZI Method is applicable for calculating the values of the parameters of members with various cross-sections, of members that are differently reinforced, of members made of different materials, as well as that of layered structural members. Stress-strain functions can be described using different equations. For calculations, only the stress-strain diagrams of materials are needed.

Specific Stress-strain Relationships and Stress Distribution Under Rotating Beam Fatigue Conditions Aug 09 2021

Analysis of Stress-strain-time Relations from the Engineering Viewpoint Feb 15 2022

Calculation of Stress and Strain from Triaxial Test Data on Undrained Soil Specimens Apr 05 2021 The formulation of constitutive relations for use in computerized analyses of free-field ground shock phenomena is based primarily on laboratory-determined material properties. These properties, as described by stress-strain relations, are not directly determined in the laboratory, but are derived through interpretation of load and deformation data measured by the experimenter. Throughout this paper, one laboratory test, the triaxial shear test, is used to illustrate the extent of interpretation required on raw data and the influence of this interpretation on recommended constitutive properties. Various techniques that have been developed to obtain stress-strain data from the triaxial test are reviewed along with current advances in measurement systems. Typical raw data are presented and calculations of axial, lateral, and volumetric strains are made based on a variety of empirical and theoretical approaches. (Author).

Engineering Considerations of Stress, Strain, and Strength Sep 10 2021

Stress, Strain, and Structural Damage Jun 07 2021

Algebraic Approximations of Stress-Strain Curves for Kevlar-Reinforced Composites Oct 11 2021 Stress-strain curves for Kevlar-cloth reinforced epoxy composites have been approximated by two-part analytic functions. Autographic test records are digitized using a computer-assisted procedure, and the digitized data are automatically processed using regression analyses routines. Tensile data are best approximated by a bilinear function; compressive data are best fit to either a parabolic-linear or a parabolic-exponential function. The errors of fit of the analytic functions to the test data are smaller than the experimental errors of the test. One application of the technique is for economic computer storage of stress-strain curves. A maximum of four constants and a one-digit code number are all that are required to store an entire stress-strain curve. Also, average stress-strain curves can readily be obtained and various moduli are easily calculated.

Comparison of Stress-strain Curves Obtained by Single-thickness and Pack Methods Aug 29 2020 The results showed that the compressive yield strength of thin sheet metals could be determined within acceptable limits by the single-thickness method. The apparatus, which was designed and used by the Aluminum Company and America, is suitable for determining yield strengths of aluminum-alloy sheet 0.020 inch and greater in thickness.

Stress-strain Characteristics of Materials at High Strain Rates. Part II. Experimental Results Feb 21 2020 These two reports were issued separately, but are cataloged as a unit. A photoelectric method for measuring displacements during high-velocity impacts is described. The theory of the system is discussed in detail, and a prototype system which was built and tested is described. The performance of the prototype system is evaluated by comparing the results which it gives with results obtained by other methods of measurement. The system was found capable of a resolution of at least 0.01 inches. static and dynamic stress-strain characteristics of seven high polymers, polyethylene, teflon, nylon, tenite M, tenite H, polystyrene, and saran, plus three metals, lead, copper, and aluminum, are described and compared by means of stress-strain curves and photographs. Data are also presented which show qualitatively the effects produced on stress-strain characteristics by specimen configuration, temperature, and impact velocity. It is shown that there is a definite strain-rate effect for all these materials except polystyrene. The effect is one of an apparent stiffening of the material with increasing strain rate, which is similar to the effect produced by lowering the temperature. The stress-strain measurements are examined critically, inconsistencies are pointed out, and possible sources of error suggested. Values of yield stress, modulus of elasticity and energy absorption for all materials (except copper and aluminum), specimen configurations, temperatures, and impact velocities included in the investigation are tabulated.

Supervisor Social Support as a Moderator of Stress-strain Relationships Dec 21 2019

Laboratory Characterization of Stress-Strain Behavior of Soils by Stress And/or Strain Path Loading Mar 24 2020 Strain path control during loading in addition to the often-desired stress path control is shown to constitute a versatile method of characterizing stress-strain response of soils in the laboratory. It allows probing stress or strain increments to be applied in any direction at an ambient effective stress state to study the stress history and stress-path-dependent response. The capture of even the potential strain softening and the post peak behavior is made possible with no difficulty. Some unique capabilities of a triaxial and a multiaxial hollow cylinder torsion apparatus of these types are demonstrated by results of tests on a saturated sand.

Some factors controlling the predictability of stress-strain bahaviour of clay Jan 02 2021

Symposium on Stress-Strain-Time-Temperature Relationships in Materials; [papers and Panel Discussion] Jul 28 2020 This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it. This work is in the public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. To ensure a quality reading experience, this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy-to-read typeface. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant.

Computer Analysis of Stress-Strain Data: Program Description and User Instructions Nov 12 2021 A program description is given for a computer program which fits analytical expressions to experimental stress-strain, tension, or compression data. For stress values up to approximately the 0.2% offset yield strength, the three parameters for the Ramberg-Osgood description are determined; for values in excess of the yield strength the two constants for a simple strain-hardening power law are found. Other quantities which are also derived from the data include several yield strengths, plastic strain components, tangent moduli, and values of Poisson's ratio. Simple statistical calculations are also made to indicate to the user the goodness-of-fit of the analytical expressions to the experimental data. The three Ramberg-Osgood parameters, together with the two strain-hardening parameters and the end point of the data need only be stored for a simple data bank of stress-strain properties, since with these parameters the engineering, stress-strain curve can be reproduced. A sample of the output data is given.

Investigation of the Stress-strain Characteristics of Materials at High Rates of Strain Nov 19 2019

Description of Stress-strain Curves by Three Parameters Nov 24 2022 A simple formula is suggested for describing the stress-strain curve in terms of three parameters: namely, Young's modulus and two secant yield strengths. Dimensionless charts are derived from this formula for determining the stress-strain curve, the tangent modulus, and the reduced modulus of a material for which these three parameters are given. Comparison with the tensile and compressive data on aluminum alloy, stainless-steel, and carbon-steel sheet in NACA Technical Note No. 840 indicates that the formula is adequate for most of these materials. The formula does not describe the behavior of alclade sheet, which shows a marked change in slope at low stress. It seems probable that more than three parameters will be necessary to represent such stress-strain curves adequately.

Symposium on Stress-strain-time-temperature Relationships in Materials Jun 19 2022

A Study of a Special Stress-strain Equation with Application to Several Metals Dec 25 2022

Roark's Formulas for Stress and Strain Apr 17 2022 The ultimate resource for designers, engineers, and analyst working with calculations of loads and stress.

Stress, Strain, and Structural Dynamics Feb 27 2023 Stress, Strain, and Structural Dynamics: An Interactive Handbook of Formulas, Solutions, and MATLAB Toolboxes, Second Edition is the definitive reference to statics and dynamics of solids and structures, including mechanics of materials, structural mechanics, elasticity, rigid-body dynamics, vibrations, structural dynamics, and structural controls. The book integrates the development of fundamental theories, formulas, and mathematical models with user-friendly interactive computer programs that are written in MATLAB. This unique merger of technical reference and interactive computing provides instant solutions to a variety of engineering problems, and in-depth exploration of the physics of deformation, stress and motion by analysis, simulation, graphics, and animation. Combines knowledge of solid mechanics with relevant mathematical physics, offering viable solution schemes Covers new topics such as static analysis of space trusses and frames, vibration analysis of plane trusses and frames, transfer function formulation of vibrating systems, and more Empowers readers to better integrate and understand the physical principles of classical mechanics, the applied mathematics of solid mechanics, and computer methods Includes a companion website that features MATLAB exercises for solving a wide range of complex engineering analytical problems using closed-solution methods to test against numerical and other open-ended methods

Stress-strain-time Behavior of Soil in One Dimensional Compression Mar 04 2021 Ground motion prediction formulas based upon elastic wave propagation in one-dimension (no strain transverse to the propagation direction) have been used widely in protective construction work. Actual soil materials exhibit many deviations from elastic behavior. This report assesses the probable influence of these non-elastic effects upon the accuracy of the above-mentioned prediction formulas, and upon the question of stress attenuation with depth. Three different models of soil behavior are assumed: a standard 3-element visco-elastic model (spring in series with spring-dashpot combination); a compacting model (straight line loading and unloading curves); and an "elastic" model in which any arbitrary shape may be assigned to the loading stress-strain curve. This report deals primarily with the first of these three models; the possible significance and probable importance of the third model are discussed briefly. By combining the theoretical and experimental results, it is shown that the elastic ground motion prediction formulas are generally valid (for cases where it is appropriate to think of one-dimensional motion); i.e. the possible effects of viscosity and inelasticity are no greater than uncertainties as to the order of magnitude of the compressibility of an in situ soil mass. (Author).

Computer-Aided Interpretation of Stress-Strain Curves May 18 2022 A computer scheme for interpreting stress-strain curves has been developed using two basic algorithms. The first locates the initial linear portion of the curve by comparing the fit of linear and quadratic curves to the data. The second determines the intersection of the offset line with the data. The scheme was tested by comparing computer results with manual results obtained by skilled observers. Results were good: tensile strength and 0.2 percent offset yield strength showed small differences, less than 2 percent. For the modulus and yield strength at 0.01 percent offset, the differences between the various observers were more significant than the differences between the computer results and the observers. For 32 samples (95 specimens) the computer results for the modulus were generally within ±2 percent of the average of the results from four observers and within ±10 percent for the 0.01 percent yield strength. Based on these results, a standard computer program has been developed which generates graphical summaries of the mechanical properties in a form suitable for permanent records.

The True Stress-strain Properties of Brittle Materials to Very High Temperatures Feb 03 2021

Atlas of Stress-strain Curves Jan 26 2023 Contains more than 1400 curves, almost three times as many as in the 1987 edition. The curves are normalized in appearance to aid making comparisons among materials. All diagrams include metric units, and many also include U.S. customary units

Stress and Strain Aug 21 2022 This is an elementary book on stress and strain theory for geologists. It is written in the belief that a sound introduction to the mechanics of continu ous bodies is essential for students of structural geology and tectonics, just as a sound introduction to physical chemistry is necessary for students of petrology. This view is shared by most specialists in structural geology, but it is not yet reflected in typical geology curricula. Undergraduates are still traditionally given just a few lectures on mechanical fundamentals, and there is rarely any systematic lecturing on this subject at the graduate level. The result is that many students interested in structure and tectonics finish their formal train ing without being able to understand or contribute to modem literature on rocks as mechanical systems. The long-term remedy for this is to introduce courses in continuum mechanics and material behavior as routine parts of the undergraduate curriculum. These subjects are difficult, but no more so than optical mineralogy or thermo dynamics or other rigorous subjects customarily studied by undergraduates. The short-term remedy is to provide books suitable for independ ent study by those students and working geologists alike who wish to improve their understanding of mechanical topics relevant to geology. This book is intended to meet the short-term need with respect to stress and strain, two elementary yet challenging concepts of continuum mechanics.

Evaluation of Stress Strain Modulus of Saturated Clays Sep 29 2020

Stress-strain-temperature-time Relationships for Refractory Materials Jul 08 2021

Polymer Viscoelasticity Jun 26 2020 Showcasing vital engineering applications to transient and dynamic pertubations of macromolecular materials, structural recovery's role in mechanical responses in the glassy state, and viscoelastic parameters that condition the non-Newtonian behaviour of polymers, this work presents a systematic account of the responses of macromolecular materials to mechanical force fields. It focuses on the most important features of the linear stress-strain relationships for ideal solids and liquids.

A More Fundamental Approach to Plastic Stress-strain Relations May 26 2020

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