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~~Introduction to Cartesian tensors - Part~~

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~~1 The Kronecker delta (MathsCasts)~~

Introduction to Tensors

What the HECK is a Tensor?!?2.

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a Tensor? Lecture 02: Introduction to

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Tensor

VIDEO IX - VECTOR AND TENSOR
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tensors
~~3. Tensors continued. Tensors
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and Tensors *Introduction to tensors*

What is a Tensor 4: Cartesian

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~~Tensors~~

Transformations of Cartesian tensors

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(any number of dimensions) Tensors are defined as quantities which transform in a certain way under linear transformations of coordinates. Second order. Let $a = a_i e_i$ and $b = b_i e_i$ be two vectors, so that they transform according to $a_j = a_i L_{ij}$, $b_j = b_i L_{ij}$

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j. Taking the tensor product gives:

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A Cartesian tensor of order N , where N is a positive integer, is an entity that may be represented as a set of 3^N real numbers in every Cartesian coordinate

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system with the property that if $(a_{ijk} \dots)$ is the representation of the entity in the x_i -system and $(a'_{ijk} \dots)$

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For Cartesian tensors we used the fact

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that the transformation coefficients were elements of orthogonal matrices to show that the result of a contraction was a tensor expression whose rank had been decreased by 2. For our present more general tensors we can still prove that the result of a

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contraction is a tensor, but the key to the proof is the use of the chain rule with one covariant and one contravariant factor.

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3.3.2 Tensors in the laws of physics;
3.3.3 Derivation #2: preserving bilinear
products; 3.3.4 Higher-order tensors;
3.3.5 Symmetry and antisymmetry in
higher-order tensors; 3.3.6 Isotropy;
3.3.7 The Levi-Civita tensor: properties
and applications; We have seen how to

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represent a vector in a rotated coordinate system. Can we do the same for a ...

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Cartesian Tensors 3.1 Su?x Notation

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and the Summation Convention We will consider vectors in 3D, though the notation we shall introduce applies (mostly) just as well to n dimensions. For a general vector $x = (x_1, x_2, x_3)$ we shall refer to x_i , the i th component of x . The index i may take any of the

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values 1, 2 or 3, and we refer to “the ...

~~Chapter 3 Cartesian Tensors - DAMTP~~

Cartesian tensors may be used with any Euclidean space, or more technically, any finite-dimensional vector space over the field of real numbers that has

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an inner product. There are considerable algebraic simplifications, the matrix transpose is the inverse from the definition of an orthogonal transformation:.

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If a tensor of rank n has components $T_{ijk\dots}$ measured in a frame with orthonormal Cartesian axes $\{e_1, e_2, e_3\}$ then its components in a frame with

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This paper considers certain simple and practically useful properties of Cartesian tensors in three-dimensional

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space which are irreducible under the three-dimensional rotation group.

Ordinary tensor algebra is emphasized throughout and particular use is made of natural tensors having the least rank consistent with belonging to a particular irreducible representation of

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Overview Contents This monograph
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physicists, chemists and other physical scientists in mind. After introducing elementary tensor operations and rotations, spherical tensors, combinations of tensors are introduced, also covering Clebsch-Gordan coefficients. ...

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Tensors of rank 0 (scalars) are denoted by means of italic type letters a ; tensors of order 1 (vectors) by means of boldface italic letters \mathbf{a} and tensors of

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rank two and higher orders by capital boldface letters A . In some special circumstances, three-dimensional Cartesian coordinates are used: a_a

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For more comprehensive overviews on tensor calculus we recommend [54, 96, 123, 191, 199, 311, 334]. The calculus of matrices is presented in [40, 111, 340], for example. Section A.1 provides a brief overview of basic algebraic operations with vectors and

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second rank tensors. Several rules from tensor analysis are summarized in Sect.

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Spherical tensors are apparently a special case of Cartesian tensors (see for example B. Baragiola, unless the pdf is wrong). Perhaps an article on Cartesian tensors including reducibility (like the section in this article, taken from Baragiola) may help these red

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The set of orthogonal tensors is denoted O_3 ; the set of proper orthogonal transformations (with

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determinant equal to +1) is the special orthogonal group (it does not include reflections), denoted $SO(3)$. It holds that $O(3) = \{\pm R / R \in SO(3)\}$. Theorem. Q is orthogonal iff $(Q \cdot u, Q \cdot v) = (u, v)$, $\forall u, v$, so Q preserves the scalar product between two vectors. ...

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1.9 Cartesian Tensors As with the vector, a (higher order) tensor is a mathematical object which represents many physical phenomena and which

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exists independently of any coordinate system. In what follows, a Cartesian coordinate system is used to describe tensors. 1.9.1 Cartesian Tensors

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Vectors are introduced in terms of cartesian components, making the concepts of gradient, divergent and curl particularly simple. The text is supported by copious examples and progress can be checked by completing the many problems at the end of each

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