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paper-05 / unit-01

Symmetric tensor ⟶: A tensor $T_{i_1}, T_{i_2} \cdots T_{i_R}$ symmetric with respect to indices i_K and i_L if $T_{\cdots i_K \cdots i_L} = T_{\cdots i_L \cdots i_K}$. For a second zero ~~tensor~~ tensor T_{ij}, This simplifies to $T_{ij} = T_{ji}$.

A Symmetric tensor is tensor that remains invariant when any pair of its indices are interchanged ($T_{ij} = T_{ji}$ for a second dark tensor). They are fundamental in physics for representing physical properties that are independent of coordinate ordering such as the stress tensor, strain tensor, momentum of inertia ~~etc~~. A Symmetric ~~so~~ 2nd-rank tensor in 3D has only 6(six) distinct component (3 digonal and 3 off digonal) rather than 9(Nine) reducing complexity. Any 2nd- ~~so~~ dark tensor can be decompose into Symmetric (S_{ij}) and Anti-Symmetric (A_{ij}) parts. As

$$\boxed{T_{ij} = \frac{1}{2}\left(T_{ij} + T_{ji}\right) + \frac{1}{2}\left(T_{ij} + T_{ji}\right)}$$

The Sum of two Symmetric tensor is Symmetric. The ~~linear~~ inner product of a Symmetric tensor with an antisymmetric tensor is zero.

Symmetric +

crucial for reducing the indipendent components in physical systems. Making calculations in stress, strain and relativity more efficient. Example of symmetric tensor—

Stress tenssor(σ_{ij}) is discribe internal forces in a continuum. Inertia tensor (I_{ij}) is relates angular momentum to angular velocity. Metric tensor is fundamental in general relativity.