

Abstract: The Penrose notation: a \LaTeX challenge

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Abstract

Over 30 years ago, Roger Penrose—Oxford mathematician and AI scourge— invented a notation for *tensors*, which has become a kind of secret language among a coterie of aficionados.

This notation lies somewhere between the classic index notation of relativists and the functorial notation of multilinear algebraists. By general consensus, Penrose' notation avoids the complexity of the first and the chilling abstraction of the second, providing a concrete model for tensor algebra and calculus of great pedagogical value.

The aim of this talk is to describe the Penrose notation—and it should be emphasized at the outset that there are absolutely no mathematical ‘prerequisites’ to understanding this description—and to present a \LaTeX package for incorporating the notation into mathematical documents.

This package is far from perfect; indeed it is its very imperfection which encourages the author to place it before this audience, in the hope (and trust) that its collective \TeX pertise will suggest improvements in the package, or even an entirely new approach.

Many mathematicians down the centuries have developed their own private languages, necessarily restricted to their notebooks by the exigencies of metal type. It is interesting to speculate on the influence of the press in ironing out idiosyncrasies of thought, in the same way that it ironed out variations in grammar and spelling.

But the digital press opens up a new possibility: these once secret languages may enter the universal realm of mathematical discourse. The one-dimensional age ushered in by Gutenberg may be at an end.

Notations like this are much more than diagrams. They hold the meaning of the document, and enter into the mathematical syntax. In our case, the first step is to express the Penrose notation in BNF form, or its fashionable equivalent, XML,

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