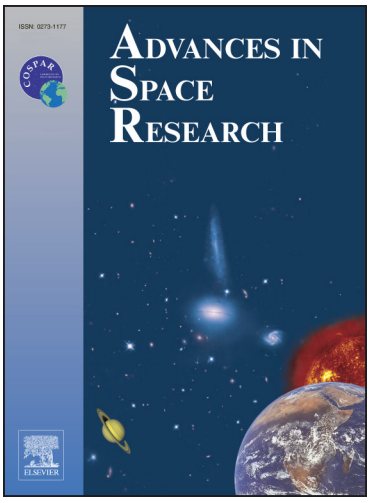


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# The Influence of Non-Gaussian Distribution Functions on the Time-Dependent Perpendicular Transport of Energetic Particles

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**Abstract**

In the current paper we explore the influence of the assumed particle statistics on the transport of energetic particles across a mean magnetic field. In previous work the assumption of a Gaussian distribution function was standard, although there have been known cases for which the transport is non-Gaussian. In the present work we combine a kappa distribution with the ordinary differential equation provided by the so-called unified non-linear transport theory. We then compute running perpendicular diffusion coefficients for different values of $\kappa$ and turbulence configurations. We show that changing the parameter $\kappa$ slightly increases or decreases the perpendicular diffusion coefficient depending on the considered turbulence configuration. Since these changes are small, we conclude that the assumed statistics is less significant in particle transport theory. **The results obtained in the current paper support to use a Gaussian distribution function as usually done in particle transport theory.**

*Key words:* magnetic fields, turbulence, energetic particles

## 1 Introduction

Non-linear theories describing the interaction between a magnetized plasma and energetic particles require assumptions about the particle statistics. The standard distribution used in such analytical treatments of particle transport

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