



The geometric AR(1) process for boundary layer wind speed simulation

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The geometric AR(1) process is defined as the exponential transformation of an AR(1) process and has under certain conditions same properties as boundary layer wind speed data. In this contribution, we analyse how far this process is a suitable model for wind speed simulation.

We compared generated data from a geometric AR(1) process with experimental boundary layer wind speed data. For this purpose, a variety of statistical methods were employed: The increment statistics dealing with the parameterisation of the increment distribution was performed. The increments of both the generated and the experimental data are of the Castaing distribution [1]. The typical cross-over behaviour can also be observed. Analysing the increment volatility acts as a cross-check and also results in agreement between the properties of the generated and experimental data. Furthermore, a fluctuation analysis was performed examining the deviation of the data from its average over the surrounding window. The geometric AR(1) process shows under given conditions the multiplicity being typical for boundary layer wind speed.

References

- [1] B. Castaing, Y. Gagne, and E.J. Hopfinger, *Velocity probability density-functions of high reynolds-number turbulence*, Physica D, **46** (1990), 177