**Atmospheric
Chemistry
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Discussions**

Interactive comment on "Piecewise log-normal approximation of size distributionsfor aerosol modelling" *by* K. von Salzen

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The manuscript describes a new hybrid approach for the representation of particle size distributions in atmospheric models. The author claims that by using a piecewise log-normal approximation the method is efficient and robust on very coarse grids, similar to a modal aerosol model, and at the same time has all properties of sectional (bin) scheme, i.e. being able to represent complicated size distributions, if the number of bins is large enough.

To show the performance of the new method, the scheme is applied within a one-dimensional aerosol model and the results are compared with a simple sectional scheme.

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Although the paper is well written, a major revision and extension is necessary to proof that the new method is in fact more efficient and accurate than state-of-the-art sectional schemes. Currently the hybrid scheme is only tested against the results of a straightforward finite-difference sectional scheme. And, e.g. in Fig. 7, it is shown that the hybrid scheme is by far less diffusive and more accurate than this sectional scheme, especially on coarse grids (10 bins). Unfortunately, it is well know that simple sectional methods are in fact very diffusive. During the last 40 years various higher-order sectional schemes have been developed to overcome this problem and it is very surprising that the author did not compare his scheme with a more sophisticated sectional method. For example, one of the most accurate methods available today is the two-moment scheme by Tzivion et al. (1987), but also the one-moment flux-form scheme of Bott (1998) is very efficient and robust, especially on coarse grids.

In addition, when introducing a new numerical method for the treatment of aerosols the the very first test should be the solution of the coagulation equation with a Golovin kernel, since this problem has a well-know analytical solution (see e.g. Bott 1998) and is quite sensitive to the numerical diffusion of the scheme. I would recomend to use an initial condition which is not log-normal, to guarantee a fair comparison.

Therefore a major revision of the manuscript is necessary to actually proof the efficiency of the proposed method.

References: Bott (1998): A flux method fro the numerical solution of the stochastic collection equation. J. Atmos. Sci., 55, 2284-2293.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3959, 2005.

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