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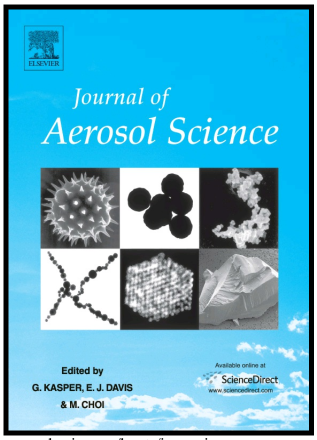

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# Brownian coagulation of a bi-modal distribution of both spherical and fractal aerosols

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**Abstract**

The use of Global Circulation Models (GCM) or mesoscale models are now widely used to understand planetary climatic systems. The increasing complexity of the models and the more and more detailed observations of the planetary bodies necessitate a corresponding increase in the complexity of the physical processes which are included in these models. In all the planetary atmospheres in the solar system, aerosols and clouds can be found and therefore microphysical processes must be included in climate models. The most accurate models are those where aerosol and cloud droplet size distributions are described with bins. This type of sophisticated and accurate models only needs a small quantity of a priori information to be used. However, they are demanding in computational resource. They can only be used in GCM at the cost of very long, and sometime prohibitive, time of computation. Alternatively, an other class of microphysical models, based on the description of the aerosol and cloud distributions with moments of distribution can be used. But, they need first to be developed and compared with a more detailed model and they need an *a priori* information about the size distributions.

In this article, we describe the development of the microphysical equations to treat the interaction of two populations of aerosols, with different geometrical structures, written with moment of distributions, interacting through Brownian coagulation. This problem was solved specifically for the case of

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