Universidad Carlos III de Madrid

Seminario del Instituto Gregorio Millán

Aerosol Coagulation: general theory, mathematical methods and recent extensions for coagulation in expanding gases

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Abstract

The coagulation rate of a suspension of particles in a carrier gas is well explained by Smoluchowski's theory, which considers the diffusion of particles as the physical process that determines this rate, leading to the well known Smoluchowski's coagulation kernel.

Once the coagulation rate is known, the evolution equation that determines the PDF of the aerosol (particle number density in terms of particle volume) is a non-linear integro-differential equation, which in general is difficult to solve. One of the reasons for this, is because, with the usual coagulation rates, the "region of interest" (where the PDF is mainly located) grows very fast with time, which, on the other hand, produces a very fast decrease with time of the numerical accuracy of any given discretization. As a consequence, a very fine discretization is needed if one wants to have high numerical accuracy throughout the whole process. This makes this problem very time consuming, especially because one is usually interested in computing the evolution of the initial PDF until the self-preserving PDF is attained, which in many cases happens at long times. A mathematical method to deal with this problem will be introduced in the first part of the talk.

While several generalizations of Smoluchowski's theory have been known for some time, the influence of density variations of the carrier gas in the coagulation rate has not been considered before. A recent extension of Smoluchowski's theory that includes this effect will be the topic of the second part of the talk.

- DÍA Y HORA: **Miércoles 24 de febrero de 2010** a las **12:30**
- LUGAR: **Edificio Sabatini. Aula 2.1.D04**