



---

# SEMINARIO DE ANÁLISIS NUMÉRICO DE ECUACIONES DIFERENCIALES PARCIALES.

Departamento de Matemática, UBB  
Centro de Investigación en Ingeniería Matemática (CI<sup>2</sup>MA), UDEC

---

*Expositor:*

***Luis Miguel Villada O.***

*CI<sup>2</sup>MA y Departamento de Ingeniería Matemática, Universidad de Concepción*

*Título de la Charla:*

***IMEX-Runge-Kutta and spectral WENO schemes  
for models of polydisperse sedimentation***

Fecha y Hora:

Martes 08 de Mayo de 2012, 16 Horas.

Lugar:

Sala Seminario, Facultad de Ciencias, Universidad del Bío-Bío, Concepción.

## **Resumen**

The sedimentation of a polydisperse suspension forming compressible sediments for particles belonging to  $N$  size classes (species) in one space dimension can be described by a  $N \times N$  coupled system of quasilinear degenerate convection-diffusion equations. We consider an implicit-explicit (IMEX) Runge-Kutta methods, for this system of strongly degenerate parabolic-hyperbolic equations which consist of applying an implicit discretization to the diffusive term and an explicit one to the convective term. The application of these schemes requires the solution of highly nonlinear and non-smooth systems. Since the efficient solution of these systems by Newton's method requires some degree of smoothness, we propose to regularize the diffusion coefficients in the model and apply suitable techniques to solve the above mentioned nonlinear systems in an efficient way. The final schemes are much more efficient, in terms of error reduction versus CPU time, than the explicit schemes. High accuracy in space is obtained by using an spectral Weighted Essentially Non Oscillatory (WENO) scheme for the convective term based on the so-called secular equation which provides access to the spectral decomposition of the Jacobian of the flux vector for this class of models. Numerical experiments for the cases  $N = 3$  for the polydisperse sedimentation model, is presented.

---

Informaciones: [royarzua@ubiobio.cl](mailto:royarzua@ubiobio.cl) y [dmora@ubiobio.cl](mailto:dmora@ubiobio.cl)