On a global climate energy balance model with dynamic and diffusive boundary conditions

Tello, Lourdes

SUMMARY

We study a global climate energy balance model (for the surface temperature) coupled with a deep ocean model which represents the evolution of the temperature with large scale of time and space.

One of the main difficulties is related to the boundary condition which is dynamic and diffusive. Another difficulty, when dealing with this type of models, comes from the term representing the feedback effect of the planetary coalbedo which is modeled by a multivalued graph.

We present results related to the existence of evolution solutions and the numerical approximation of the solutions of the coupled model. Some of these results were obtained in collaboration with J.I. Diaz (U.C.M.) and A. Hidalgo (U.P.M.).

Keywords: global climate energy, planetary coalbedo model, evolution solutions

AMS Classification:

References

[1] J.I. Díaz, L. Tello. A 2D climate energy balance model coupled with a 3D deep ocean model. *Electronic Journal of Differential Equations*, Conf. 16, (2007).

[2] J.I. Díaz, L. Tello. On a climate model with a dynamic nonlinear diffusive boundary condition. *Discrete and Continuous Dynamical Systems* series S, Vol 1, N. 2, (2008), 253-262.

[3] A. Henderson-Sellers and K. McGuffie. A Climate Modelling Primer, John Wiley&Sons, (2005).

[4] A. Hidalgo, L. Tello. A Finite Volume Scheme for simulating the coupling between deep ocean and an atmospheric energy balance model. In the book Modern Mathematical Tools and Techniques in Capturing Complexity. Springer Series in Understanding Complex Systems (2011), 239–255.

[5] R. G. Watts, M. Morantine. Rapid climatic change and the deep ocean. *Climatic Change* 16 (1990), 83–97.

[1]Tello, Lourdes
Departamento de Matemática Aplicada. ETS Arquitectura
Universidad Politécnica de Madrid. Spain.
Av. Juan de Herrera 4. Madrid 28040
l.tello@upm.es