TRANSIENT RADIATION AND CONDUCTION HEAT TRANSFER IN TWO-DIMENSIONAL COMPLEX GEOMETRIES

F. Asllanaj, L. Soudre, G. Parent and G. Jeandel
LEMTA (Laboratoire d'Énergétique et Mécanique Théorique et Appliquée)
CNRS UMR 7563 – Université Henri Poincaré, Nancy 1
Faculté des Sciences et Techniques BP 239 – 54506 VANDOEUVRE Cedex, France
Tel (33) 383 684 696 – mail Fatimir.Asllanaj@lemta.uhp-nancy.fr

ABSTRACT. This paper is devoted to transient combined radiation and conduction heat transfer in a gray absorbing – emitting medium. Heat transfer is applied in a two dimensional complex shaped domain using unstructured triangular meshes. The radiative transfer equation (RTE) is solved by using a new finite volume method (FVM) based on a cell vertex scheme and associated to a modified exponential scheme. The PHALM (Parallel Hierarchical Adaptative MultiLevel) code is used to solve the energy balance equation using low or high order finite elements. Some benchmark cases applied to different geometries are used to validate the developed code. The results obtained demonstrate the accuracy of the present numerical model.

Keywords: transient radiation-conduction, complex geometries, Finite Volume Method, Finite Elements Method