ALTERNATIVE MODELS FOR OPTICAL PROPERTIES OF A HIGHLY-POROUS MEDIUM COMPOSED OF WOOD CHIPS

Leonid A. Dombrovsky, Pierre Lea, Didier Caron, Jean-François Henry, Hervé Pron, and Jaona H. Randrianalisoa

1 Joint Institute for High Temperatures, 17A Krasnokazarmennaya St., Moscow, 111116, Russia
2 GRESPI Lab., the University of Reims, Champagne–Ardenne, 51687 Reims Cedex 2, France

ABSTRACT. The highly-porous layer of oakwood chips is used as a relatively pure reference material in laboratory studies of heating, drying and pyrolysis of organic waste. The general computational model for thermo-chemical processes accompanying the industrial production of a synthesis gas and bio-diesel fuels includes thermal radiation, which is one of the important heat transfer modes. Therefore, a relatively simple model for spectral optical properties of a medium composed of wood chips is desirable to avoid time-consuming calculations. Such a model based on analytical solution for diffusely irradiated wood plates is suggested in the paper. A comparison with direct numerical simulation of radiative transfer confirms good accuracy of the model. A similar approach can be recommended to estimate optical properties of other semi-transparent disperse systems containing randomly oriented large particles.