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20057. *Reactive flows of monostable type and its applications in phase transitions.*

In this talk, we shall discuss a model governing fluid flows involving liquid/vapor phase transitions, in particular that for fluids with high molar heat capacities such as gasoline and diesel. The system is a combination of conservation laws and a reaction-diffusion equation. The conditions existence and nonexistence of traveling waves are obtained. Riemann solvers are constructed and their behavior is compared with the actual experiments to show that the model can capture almost all one-dimensional wave patterns observed in experiments. The symmetry breaking and ring formation phenomenon is explained. The study of the stability of its traveling waves provides a way to look at the Wilson Lines of metastable fluids and the onset of rapid phase changes in such fluids. Results on the spherical symmetric flows will be presented. (Received September 15, 2010)