Numerical Analysis of a closed loop Thermosyphon model with a viscoelastic fluid

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We analyze the motion of a viscoelastic fluid in the interior of a closed loop thermosyphon under the effects of natural convection and a given external heat flux. Numerical experiments are performed in order to describe the behavior of the solution for different ranges of the relevant parameters.

$$\begin{cases} \varepsilon \frac{d^2v}{dt^2} + \frac{dv}{dt} + G(v)v = \oint Tf, v(0) = v_0, \frac{dv}{dt}(0) = w_0 \\ \frac{\partial T}{\partial t} + v\frac{\partial T}{dx} = h(x, v, T) + \gamma \frac{\partial^2 T}{\partial x^2}, T(0, x) = T_0(x) \end{cases} \tag{1}$$

Where $v(t)$ is the velocity, $T(t, x)$ is the distribution of the temperature of the viscoelastic fluid in the loop, γ is the temperature diffusion coefficient,$G(v)$ is the friction law at the inner wall of the loop, the function f is the geometry of the loop and the distribution of gravitational forces, $h(x)$ is the heat flux and ε is the viscoelastic parameter. Suitable parameters are chosen to carry out the different numerical analysis. The numerical experiments are summarized for a detailed analysis of the behaviour of the system. The experiments made in this poster come to verify the complex nature of the behavior of the models of the thermosyphon system.

References

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