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MODELING THE INFLUENCE OF MAGNETIC FIELDS ON OXYGEN DISTRIBUTION [1]

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The influence of external magnetical fields on a flame is well known ([1,2]). A part of this effect is attributed to the magnetohydrodynamical effects due to Lorentz force acting on the weakly ionised gas, and another part on the fact that oxygen is paramagnetic (i.e., it is attracted by external magnetic fields) whereas most other gases are diamagnetic, hence magnetic field influences the distribution of oxygen [3] and the whole combustion process.

The effects of thermal convection are reduced when the flame is considered in microgravity [4]. Then the magnetic forces become dominant, however, they only act on the paramagnetic species, namely, the oxygen. We consider the 2D advection-diffusion-reaction system, where the single chemical reaction is modeled by a single step Arrhenius law. The results of a numerical study of temperature and the distribution of oxygen in a gas mixture are presented. Approximation of the nonlinear system is based on the finite difference method.

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