The field-dependent flow-front speed of natural convection in magnetic fluids JUN HUANG, YI LIU, ZHENYU ZHOU, WEILI LUO, University of Central Florida — The flow front of natural convection in a magnetic fluid was studied in applied field with two configurations: one with temperature gradient, $\nabla T$, parallel to the field gradient, $\nabla B$, and the other with $\nabla T$ anti-parallel to $\nabla B$. The temperature profiles inside the two quasi one-dimensional cells were used to analyze the speeds of flow fronts. We found that when $\nabla B$ is anti-parallel to $\nabla T$, the flow speed is slower than that in zero field; while when $\nabla B$ is parallel with $\nabla T$, the flow speed is faster than that in zero field. These results confirmed our earlier work that in the parallel configuration the field enhances, while in the anti-parallel configuration the field suppresses the convection.

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