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An experimental validation of the influence of flow profiles and stratified two-phase flow to Lorentz force velocimetry for weakly conducting fluids[1] ANDREAS WIEDERHOLD, RESCHAD EBERT, CHRISTIAN RESAGK, TU Ilmenau, RESEARCH TRAINING GROUP: "LORENTZ FORCE VELOCIMETRY AND LORENTZ FORCE EDDY CURRENT TESTING" TEAM
— We report about the feasibility of Lorentz force velocimetry (LFV) for various flow profiles. LFV is a contactless non-invasive technique to measure flow velocity and has been developed in the last years in our institute. This method is advantageous if the fluid is hot, aggressive or opaque like glass melts or liquid metal flows. The conducted experiments shall prove an increased versatility for industrial applications of this method. For the force measurement we use an electromagnetic force compensation balance. As electrolyte salty water is used with an electrical conductivity in the range of 0.035 which corresponds to tap water up to 20 Sm^{-1}. Because the conductivity is six orders less than that of liquid metals, here the challenging bottleneck is the resolution of the measurement system. The results show only a slight influence in the force signal at symmetric and strongly asymmetric flow profiles. Furthermore we report about the application of LFV to stratified two-phase flows. We show that it is possible to detect interface instabilities, which is important for the dimensioning of liquid metal batteries.

[1]Deutsche Forschungsgemeinschaft DFG

Andreas Wiederhold
TU Ilmenau

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