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NUMERICAL MODELING OF ALUMINIUM ELECTROLYSIS TRACK NUMBER 1200

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ABSTRACT

Pure aluminium is produced using the Hall-Héroult process. Aluminium oxide is dissolved in molten cryolite, the simplified reaction occuring during electrolysis being:

$$2Al_2O_3 + 3C \rightarrow 4Al + 3CO_2,$$

where the carbon is provided by the anodes. According to [1], the carbon footprint of the aluminum industry is 1.7% of global emissions from all sources, therefore, huge efforts are done in order to increase the process efficiency. However, the operating conditions are extreme (high temperatures 950^oC, large currents $300kA$) and the physical phenomena involved are complex: gas is produced at the anodes, magnetohydrodynamic forces induced by the electrolysing current generate movements in the molten liquids, alumina is transported and dissolved in these liquids. Therefore, numerical simulation is an unavoidable tool in order to control the process.

The goal of this minisymposium is to gather numerical modelers from universities, research centers and industry, in order to present their state-of-the art activities pertaining to this multiphysics process [2, 3].

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