



PHD THESIS

Sujet de thèse

Multivariable modelling and control for aluminium production

Modélisation et commande multivariables pour la production d'aluminium

Institution: Univ. Grenoble Alpes, Gipsa-lab, Control Syst. Dep., Saint-Martin d'Hères, France

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Industrial Partner: Rio Tinto Alcan, Saint-Jean de Maurienne, France

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Expected starting time: September 1st, 2018.

Application requirements: Applicants must hold a Master degree (or be about to obtain one) or have a university degree equivalent to a European Master (5-year duration).

Strong skills in systems and control are expected, as well as a good taste for industrial applications. Some knowledge in electro/magneto dynamics would be a plus.

Short description: Aluminum manufacturing is a challenging industrial area, mostly based on alumina electrolysis, a process that is highly demanding in electrical power. In particular, alumina electrolysis typically relies on a series of (large) electrolytic cells. Such cells are composed by a bath containing alumina in which a set of anodes is dipped. The base of each cell plays the role of the cathodic electrode in the electrolysis process. In this process, energy consumption in particular depends on the anode-cathode relative distance. However, such a distance cannot be measured.

The main purpose of this PHD thesis is to study, design, and test multivariable feedback control laws to optimally regulate the anode-cathode relative distance. The project will be organized in three different stages: dynamical modeling and identification, control and observer design, experimental validation and tuning. The work will mostly take place at Gipsa-lab, in collaboration with Rio Tinto Alcan (RTA). Experimental activities will be conducted at the RTA research center in Saint-Jean de Maurienne.