Transient Magnetic – Translating Motion Finite Element Model of the Annular Linear Induction Pump

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Abstract— In the context of replacing the mechanical pumps with high flowrate Annular Linear Induction Pumps (ALIP) for the Generation IV of nuclear plants in France, the paper constitutes a study of startup, steady state operation and dynamic behavior of a double sided ALIP in bloc pumping assumption, based on finite element transient magnetic – translation motion coupling models. Using a model of pump load proportional with the square of the flowrate, the Electromagnetic Pressure – Flowrate characteristic was determined and considered further in expressing what a stable pump operating state represents. Data regarding the highest admissible jump load are given. The dependence on flowrate of pumping efficiency is presented and provides with a view regarding the maximum capabilities of such devices of converting electrical energy into motion