

## Reluctance Synchronous Motors Modelling and Analysis

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*Abstract*— This paper presents a possibility for the theoretical and experimental modelling and analysis of the reluctance synchronous motors asynchronous starting. In the first part of the paper the two axes theory mathematical model of the reluctance synchronous motor is presented. The accent is laid on the model written in matrix form, which is easy to implement in Matlab. An original Matlab program has been conceived with the help of this model (detailed in this paper); it makes possible the analysis of the asynchronous starting dynamic regime when the motor parameters are modified (resistances, inductivities and inertia moment). The simulations obtained with the help of this program and the conclusions emerging from them are presented. There are detailed the dependences of the current, speed and torque versus time and the mechanical characteristics obtained for the cases when the rotor resistance and the inertia moment are modified in turn. Finally, there are presented the test stand and the experimental determinations, which confirm the theoretical conclusions validity. A special attention is paid to the test stand structure, which contains a high speed data acquisition board assembled inside a computer. In order to confirm the conclusions obtained theoretically, there are presented the curves of the phase current and the rotor angular speed versus time.