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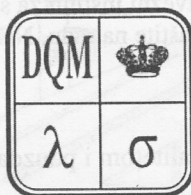


June 25-26, 2009, Belgrade, Serbia

## UPRAVLJANJE KVALITETOM I POUZDANOŠĆU DEPENDABILITY AND QUALITY MANAGEMENT

Plenarna saopštenja	☐	Plenary Lectures
Inženjerstvo kvaliteta	☐	Quality Engineering
Inženjerstvo pouzdanosti	☐	Reliability Engineering
Konkurentno inženjerstvo	☐	Concurrent Engineering
Inženjerstvo sistema	☐	Systems Engineering
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Od teorije ka nauci o organizaciji poslovanja	☐	From Theory to Science of Business Organization
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- Reliability Engineering
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- Military Engineering
- Knowledge Management and Organization Competitiveness
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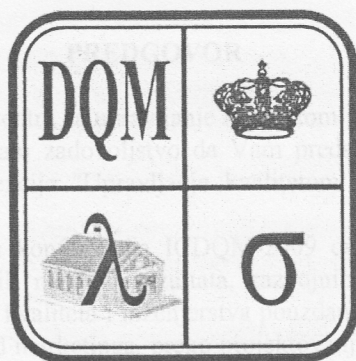
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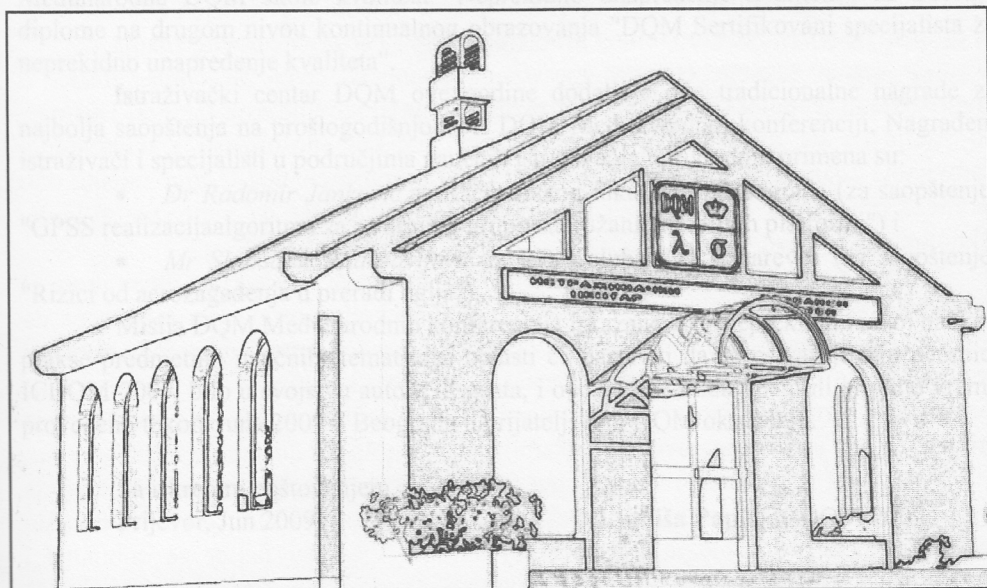
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## MATHEMATICAL MODELS OF SYNCHRONOUS GENERATOR

Jeroslav Živanić, Mališa Žižović, Mladen Janjić

Tehnički fakultet, Čačak

**Summary:** *This paper presents two examples of mathematical models applicable in modelling and simulation of synchronous electrical generators. Further, a general MatLab model of synchronous machine is presented, with results of simulation.*

**Key words:** *modelling, simulation, synchronous generator, simulink.*

### 1. INTRODUCTION

Stability studies, such as small signal, transient rotor angle and voltage stability studies are used as an effective tool for the evaluation of power system performance under undesirable conditions. Further, the aim of these studies is to implement control strategies for the enhancement of the overall stability of the power system.

In order to develop these studies, it is necessary to use adequate mathematical models of the synchronous generators and the broad number of control systems involved in the steady state and, more importantly, dynamic state operation of the power systems. Thus, results derived from any stability study directly rely on the mathematical models of each of the devices taken into consideration. This paper presents two mathematical models of the synchronous generator needed for modelling, simulation and further use in the analysis of synchronous generator.

### 2. MATHEMATICAL MODEL OF THE SYNCHRONOUS GENERATOR

Experimentation with power system components is expensive and time consuming, therefore simulations are a fast and economic method to conduct studies in order to analyze this type of devices. Power system elements have to be designed to endure over voltages and faults. Due to the great electrical and mechanical stress that these devices support during transient conditions, the design of these components relies on the dynamic characteristics of these elements.

From this it is obvious that modelling and simulation are the most important in the design and operation of power systems.













