



FEJ3221 Konstruktion av permanentmagnetiserande synkronmaskiner 9,0 hp

Design of Permanent Magnet Synchronous Machines

Fastställande

Kursplan för FEJ3221 gäller från och med VT12

Betygsskala

G

Utbildningsnivå

Forskarnivå

Särskild behörighet

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

After the course, the student should be able to:

- list different existing topologies of permanent magnet machines

- describe and compare distributed and concentrated windings
- explain the principle of field-weakening for permanent magnet synchronous motors
- choose the appropriate permanent magnet materials for a given construction with regard to functionality, operating conditions, economic and environmental factors
- explain and compare the properties of iron laminations and soft magnetic composites in relation to their use in electrical machines
- enumerate different loss components in a machine and relate them to different existing models
- develop a simple analytical model of the thermal behaviour of a machine taking into account the relevant losses for the application
- explain all the tasks in the design procedure and apply them to a surface mounted permanent magnet motor with distributed windings with simplified analytical models
- explain discrepancies between results from different analytical methods through knowledge about the various approximations they are based on
- describe the concepts of finite element software tools and apply them in the analysis of permanent magnet synchronous machines
- report and present the results of the design project that has been conducted for a chosen application
- do a critical evaluation of the report and presentation of the specific studies conducted by the other students

Kursinnehåll

Function and components of electric drive systems, application specifications, energy conversion in PM machines, torque derivation, loss, thermal constraints, modelling, permanent magnet materials, magnetic materials, topologies of PM machines (radial, axial and transverse), distributed and concentrated windings, field-weakening.

Kursupplägg

12 hours lecture, 2 hours tutorial, 82 (42+40) hours project, 15 hours project meetings

Kurslitteratur

Course folder EJ2221 Design of Permanent Magnet Synchronous Machines, 2011.

Examination

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

At least 1 full-time week of project activity is preferably linked to the student's own research.

Övriga krav för slutbetyg

- 6 status reports
- 5 oral presentations
- 5 opposition reports
- Final report and oral examination

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.