

**Sisteme giroscopice complexe de orientare, stabilizare si control**

**Complex gyroscopic systems for orientation, stabilization and control**

**Obiectiv principal**

Disciplina contribuie la perfectionarea inginerilor de profil aerospacial, familiarizându-i cu modelarea matematica a girostabilizatoarelor de forta monoaxiale, biaxiale si triaxiale, a capetelor giroscopice de dirijare, precum si sinteza in frecventa a diferitelor structuri de girosisteme pentru orientare si stabilizare.

**Course Objective**

The discipline contributes to the improvement of aerospace profile engineers, familiarizing them with the mathematical modeling of the monoaxial, biaxial and triaxial force gyrostabilizers, the gyroscopic steering heads, as well as the frequency synthesis of the different gyroscopic structures for orientation and stabilization.

**Curs**

**2 ore pe săptămână, total 28 ore**

- Modelarea matematica a girostabilizatoarelor de forta monoaxiale, biaxiale si triaxiale cu diferite tipuri de giroscoape mono si birotor, cu retele de corectie de tip integrator, integro-diferentiator si rotitor de faza
- Capete giroscopice de dirijare
- Dinamica sistemelor giroscopice liniare
- Sinteza sistemelor giroscopice pentru stabilizare, navigatie si dirijare: sinteza in frecventa a diferitelor structuri de girosisteme pentru orientare si stabilizare, monoaxiale, biaxiale si triaxiale
- Proiectarea elementelor structurale, componente ale sistemelor giroscopice: giromotoarelor; suspensiilor cardanice, cu flotor, gazodinamice, magnetice si electrostatice

**Course**

**2 hours weekly, total 28 hours**

- Mathematical modeling of monoaxial, biaxial and triaxial force stabilizers with different types of mono and rotary gyros, with correction networks of integrator, integro-differentiator and phase rotor.
- Gyroscopic steering heads
- Dynamics of linear gyroscopic systems
- Synthesis of gyroscopic systems for stabilization, navigation and steering: frequency synthesis of different gyroscope structures for orientation and stabilization, monoaxial, biaxial and triaxial
- Design of structural elements, components of gyroscopic systems: gyro engines; cardan suspensions, with float, gas-dynamic, magnetic and electrostatic

**Laborator**

**1 oră pe săptămână, total 14 ore**

- Testarea giroplatformelor de tip SFIM.
- Testarea capetelor giroscopice de dirijare cu giroscoape in suspensie cardanica interioara. Studiul unei platforme giroscopice de tip Strap-Down.
- Proiectarea girostabilizatoarelor de forta monoaxiale asistata de calculator, folosind metode frecventiale.
- Proiectarea girosistemelor monoaxiale pentru orientare si stabilizare folosind algoritmi bazati pe criteriile patratiche de calitate.
- Girostabilizatoare de forta cu estimatoare de stare deterministe.
- Filtrarea erorilor de stabilizare ale girosistemelor folosind filtrul Kalman-Bucy.

**Laboratory**

**1 hour weekly, total 14 hours**

- Testing of SFIM type gyro platforms.
- Testing of gyroscopic heads with gyroscopes in internal cardan suspension.
- Study of a Strap-Down gyroscopic platform.
- Design of computer-assisted monoaxial force gyrostabilizers, using frequency methods.
- Design of monoaxial gyro systems for orientation and stabilization using algorithms based on quality quadratic criteria.
- Force stabilizers with deterministic state estimators.
- Filtering the stabilization errors of the gyro systems using the Kalman-Bucy filter.