

# ENGINEERING SCIENCE

## *I - Mechanics of solids*

### KINEMATICS OF INDEFORMABLE SOLIDS

Speed field, instantaneous rotation vector, kinematic torque  
Normalized contacts between solids

### STATICS OF SOLIDS

Modelisation of mechanical actions  
Isolation of a material system  
Fundamental princip of statics

### DYNAMICS OF SOLIDS

Kinetics (kinetic and dynamic torque, kinetic energy  
Power (external strains power)  
Dynamics (Fundamental princip, kinetic energy princip)

### SOLID CHAINS

Structure graph  
Mobility and hyperstatism of a mechanism  
Equation writing

## *II - Automatics*

### REPRESENTATION OF LINEAR CONTINUOUS INVARIANT SYSTEM

Differential equations  
Laplace transform  
Block diagram  
First and second order systems  
Bode diagrams

### ANALYSIS OF SERVO SYSTEMS : PRECISION, RAPIDITY, STABILITY

Transfert function with feed-back  
Stability (Routh criterion, graphic criteria, gain, phase and amplitude margins)  
Static precision and permanent errors. Effects of regulators

### COMBINATIONAL SYSTEMS

Boole algebra  
Elements of realisation with electronics or electro-mechanics

### SEQUENTIAL SYSTEMS

The French GRAFCET model