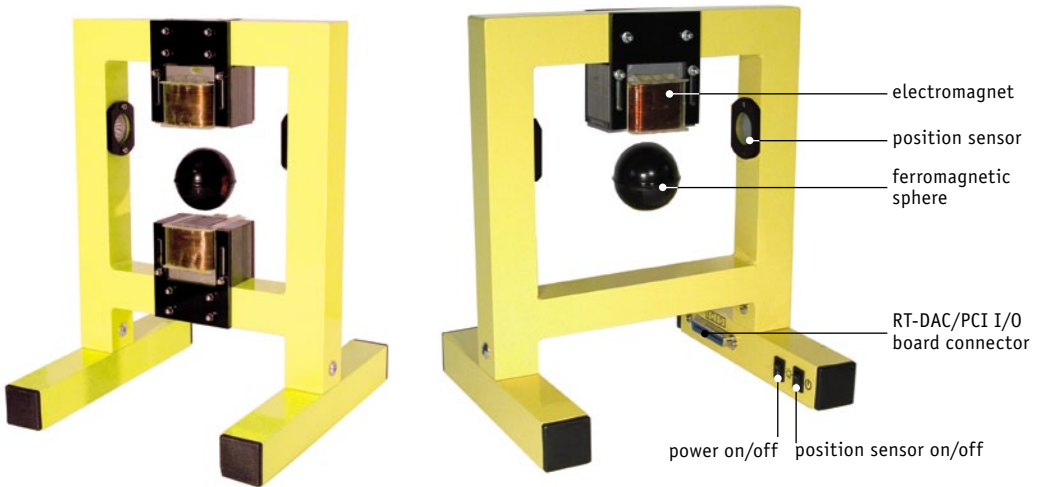


Magnetic Levitation Systems

The frictionless electromagnetic control systems



The Magnetic Levitation System (MLS) is a nonlinear, open-loop unstable, time varying and frictionless, dynamical system. The basic principle of MLS operation is to apply the voltage to an electromagnet to keep a ferromagnetic sphere levitated. Moreover, the sphere can follow a desired position value varying in time. The coil current is measured to examine identification and to perform control strategies. To levitate the sphere a real-time controller is required. The equilibrium stage of two forces (the gravitational and electromagnetic) is maintained by the controller to keep the sphere in a desired distance from the electromagnet. The system is fully integrated with MATLAB/Simulink and operates in the real-time in MS Windows. This feature extends MLS application and is useful in robust controllers design. In the case of two electromagnets the lower one can be used for an external excitation or as a contraction unit. Alternatively, a PC

equipped with Single Board RIO of National Instruments with the power interface can be used. A fragment of the LabVIEW controller is shown in the figure below.

Hardware:

- electromagnet
- ferromagnetic sphere
- position sensor
- current sensor
- power interface
- the single board RIO (the PWM control and encoder logics are stored on the board) or RT-DAC I/O internal PCIe or external USB board (the PWM control and encoder logics are stored in a XILINX chip) or a PLC

Dimensions: 280x280x390 mm

