

SIMULATION OF A MAGNETIC LEVITATION CONTROL USING FUZZY LOGIC

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ABSTRACT

The objective of this project is to simulate a magnetic levitation of a spherical ball suspended in midair. This project develops the mathematical equations of motions describing motion of the spherical ball and the equations are modeled in Matlab-Simulink. A fuzzy logic controller has been designed and implemented to control the position of the spherical ball. To visualize the magnetic levitation of the spherical ball Virtual Reality is been used. The scope of the project is targeted to mechanical undergraduate students. Software entitled 'Simulation of a magnetic levitation control using fuzzy logic' which is used to study to control the complicated system has been successfully developed. The software consist of two parts, in which the first part is to control the spherical ball either up or down and the second part is to control the spherical ball up and down by using sinusoidal method. This software is developed using Matlab version 6.5.1. Simulink was used to create a system which consists of mathematical models representing the motions of the spherical ball equations. The motion of the spherical ball equations were identified and simplified (Newton's Laws of Motion). The simplified equations were modeled in Simulink by using blocks which are available in the simulink library browser. The input parameter from the desired and measured position was determined and it is modeled in separate subsystems entitled 'Fuzzy Controller'. From the fuzzy controller current supplied to upper and lower electromagnet. The equation of upper and lower electromagnet force were modeled in separate subsystem entitled 'Upper electromagnet' and 'Lower electromagnet'. Force supplied to spherical ball and the equation of the motion was modeled in another separated subsystem which is entitled 'Sphere'. The output from subsystem 'sphere' was connected to another subsystem entitled 'position sensor' and the 'Position sensor' was connected to VR convertor.