

# Generalized nonholonomic mechanics and the control of servomechanisms

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A generalized nonholonomic system (GNHS) is, in essence, a Lagrangian system subject to kinematic constraints such that its corresponding constraint forces do not necessarily satisfy D'Alembert principle. These systems naturally appear in problems of control and robotics, as well as in simplified models of pneumatic tires and other elastic rolling bodies. In this talk we shall define the GNHS and present some applications of them to the automatic control of servomechanisms. Such applications are based on the following idea. Instead of designing directly the control law in order to generate in the system a given behavior, kinematic constraints are designed in such a way that this behavior takes place, and control signal is obtained as the related constraint force. We shall illustrate this idea with the stabilization of the inertia wheel pendulum.