The necessary condition for optimal control of dynamical systems

1 author:

Raheam A Mansor Al-Saphory
Tikrit University

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Abstract:

In this work, we have studied and analyzed the following non-linear dynamical systems:

$$\begin{cases} \dot{x}(t) = f\big(t, x(t), u(t)\big) \\ x(0) = x_0 \\ x(1) = x_1 \end{cases}$$

Augmented with the following cost functional

$$\mathbb{J}(x(t), u(t) = \int_0^1 g\big(t, x(t), u(t)\big) dt \rightarrow inf$$

And we found the necessary conditions for optimal control, by using Lagrange principle.