REPUBLIC OF IRAQ MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH AL-MUSTANSIRIAH UNIVERSITY COLLEGE OF SCIENCE DEPARTMENT OF MATHEMATICS

> NECESSARY CONDITION FOR OPTIMAL CONTROL OF DYNAMICAL SYSTEMS

> > A THESIS

SUBMITTED TO THE COLLEGE OF SCIENCE, UNIVERSITY AL-MUSTANSIRIAH AS A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN MATHEMATICS BY

RAHEAM A MANSOR AL-SAPHORY

SUPERVISED

BY

ABDUL SAMEE A AL-JANABI

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Abstract:

In this work, we have studied and analyzed the following nonlinear dynamical systems:

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

Augmented with the following cost functional

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

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

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