Aaron Strauss

AN INTRODUCTION TO OPTIMAL CONTROL THEORY

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The opinion according to which economic investigation, in the last instance, is reduced to optimization, is fully justified. For this reason, a course introducing the optimal control theory, harmoniously blending accessibility with the modern mathematical language, is most welcome and corresponds to a stringent necessity. The present work strengthens all the qualities required by the task of introducing the domain of the optimal control theory to all those interested in this matter.

In the "Introduction" some general notions and definitions are presented, a few indications being given on the mathematical methods used in the work.

In chapter 2, "Problem of control," the constitutive elements are presented: a common differential equation (E), the range of control (Ω), an admissible class of control (U), an initial point (x_0) and a goal (G). The problem of optimal control is then tackled by the addition of a cost functional (C).

The "example of the train" shown in chapter 3 is methodically expounded, so that it substantially aids in fixing the preceding ideas.

Controlability is defined in chapter 4, the theorems of "limited" control and "unlimited control" being presented.

Chapter 5 deals with the same problem as the preceding chapter, but for certain sub-classes of U.

Chapter 6 deals with optimal systems of linear control, the theorems of existence and necessity for extremal control being given.

Chapters 7 and 8 deal with general systems of control, two theorems of existence being given, as well as the principle of optimality, the principle of the maximum (Pontryagin) and an application to the synthesis from the "example of the train".

Chapter 9 indicates further (future) themes, after which a list of reference books and of symbols, as well as an Index for definitions, follow.

The methodics and systematizing of this work deserves to be pointed to. It fully justifies the accomplishment of the author's aim, viz. to acquaint the reader with some of the problems and results in the control theory, to illustrate the manner in which these results are applied and to give him a handy guide for future reading in this field.

Prof. A. Halanay initiated at the Centre of Economic Computation and Economic Cybernetics a seminar having as its object the optimal control theory, in which young research workers in economy take part. Aaron Strauss' book was used as an introduction to the seminar, and on that occasion its particular qualities were also confirmed in practice.

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