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Optimization—Theory and applications, Problems with ordinary differential equations, by Lamberto Cesari, Applications of Mathematics, vol. 17, Springer-Verlag, New York, 1983, xiv + 542 pp., $68.00. ISBN 0-3879-0676-2

The classical calculus of variations (of functions of one variable) appears to have culminated in the 1940s with Bliss' book [1] and the work of the Chicago school. This classical theory deals with problems typified by the Bolza problem of minimizing an expression of the form

$$g(a, x(a), b, x(b)) + \int_a^b f_0(t, x(t), x'(t))\, dt$$

by a choice of a function $x\colon [a, b] \to \mathbf{R}^n$ that satisfies certain differential equations and boundary conditions. This theory has two basic ingredients, namely necessary conditions and sufficient conditions for minimum, both of an essentially local character.

The classical theory leaves the existence of a minimizing solution an open question. Its necessary conditions may reveal candidates for a local minimum