Continuous-time nonlinear programming under generalized $(\alpha, \rho) - (\eta, \theta)$ -type I invexity

Ioan M. Stancu-Minasian and
Andreea Mădălina Stancu andreea_madalina_s@yahoo.com
"Gheorghe Mihoc-Caius Iacob" Institute od Mathematical Statistics and Applied Mathematics of the Romanian Academy, Calea 13 Septembrie, Nr. 13, Sector 5, 050711, Bucharest, Romania

Abstract

Consider the continuous-time programming problem with nonlinear operator equality and inequality constraints

$$\text{(P)} \quad \text{minimize } \phi(x) = \int_0^T f(x)(t)\,\mathrm{d}t$$

subject to
$$g(x)(t) \leq 0 \text{ for all } t \in [0,T],$$
$$h(x)(t) = 0 \text{ for all } t \in [0,T]$$
$$x \in W^n[0,T] \equiv W^n_{2,1}[0,T],$$

where $W^n[0,T]$ is the Hilbert space of all absolutely continuous n-dimensional vector functions $t \to x(t) \in \mathbb{R}^n$ (n-dimensional Euclidean space) defined on the compact interval $[0,T] \subset \mathbb{R}$ with Lebesgue square-integrable derivative, f, g (with components $g_1, g_2, \ldots g_p$), and h (with components $h_1, h_2, \ldots h_q$) are nonlinear continuously Fréchet differentiable operators from $W^n[0,T]$ into $C[0,T]$, $C^p[0,T]$, and $C^q[0,T]$, respectively, with $C^r[0,T]$ denoting the space of all continuous r-dimensional vector functions defined on $[0,T]$.

We establish sufficiency optimality criteria for Problem (P) under generalized $(\alpha, \rho) - (\eta, \theta)$-type I invexity conditions.

AMS Classification: 90C30, 90C46, 90C48.