BOUNDARY VALUE PROBLEM FOR FUNCTIONAL DIFFERENTIAL INCLUSIONS ON MANIFOLDS AND FIXED POINTS OF INTEGRAL-TYPE OPERATORS

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Abstract. We investigate the boundary value problem for second order functional differential inclusions of the form $D_{\nabla} h(t) \in F(t, m(\theta), m'(\theta))$ on a complete Riemannian manifold for a $C^1$-smooth curve $\varphi: [-h, 0] \rightarrow M$ as initial value, and a point $m_1$ that is non-conjugate with $\varphi(0)$ along at least one geodesic of Levi-Civita connection. Here $D_{\nabla}$ is the covariant derivative of Levi-Civita connection and $F(t, m(\theta), X(\theta))$ is a set-valued vector field with closed convex values that satisfies upper Caratheodory condition and is given on couples: a continuous curve $m(\theta)$ in $M$, $\theta \in [-h, 0]$, and a vector field $X(\theta)$ along $m(\theta)$ that is continuous from the left and has limits from the right, under the assumption that $F$ has uniformly quadratic or less than quadratic growth in velocity. Some conditions on certain geometric characteristics and on the distance between $\varphi(0)$ and $m_1$, under which the problem is solvable, are found. The solution is constructed from a fixed point of an integral-type operator.

Key Words and Phrases: Fixed points, integral operators, Riemannian manifolds, boundary value problem, second order functional differential inclusions, non-conjugate points.

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