1107-49-495 **Yuri Ledyaev*** (ledyaev@wmich.edu), Department of Mathematics, Western Michigan University, Kalamazoo, MI 49008-5248, and **Robert Kipka**, Department of Mathematics and Statistics, Queens Univerity, Kingston, Ontario , Canada. *Dynamic Optimization on Infinite-Dimensional Manifolds.*

We study optimal control problems in which the state evolves on an infinite-dimensional manifold M which is modeled over Banach space E.

Minimize

$$\ell(q(0), q(T)) + \int_0^T L(q(t), u(t))\ dt$$

subject to dynamic constraint

$$\dot{q}(t) = f(t, q(t), u(t)), \quad q(0) = q_0 \tag{1}$$

and endpoint constraints

$$(q(0), q(T)) \in S \subset M \times M. \tag{2}$$

where $q(t)$ describes a state of the control system (1), $u(t)$ is a control function taking values in a set U, $f(t, q, u)$ is a parametric family of vector fields $f : [0, T] \times M \times U \to TM$ describing a dynamics of the system, the set S describes end constraints for trajectory of (1). We discuss a mathematical framework for analysis of such optimal control problems on manifolds. These problems arise in study of dynamic optimization for partial differential equations with symmetries and they have not been studied before. We develop nonsmooth analysis methods and Lagrangian charts techniques which can be used for study of global variations of optimal trajectories of such control systems and derivation of Pontryagin maximum principle for them. (Received January 20, 2015)