

On indirect variational formulations for operator equations¹

Svetlana A. Budotchkina and Vladimir M. Savchin

(Communicated by Oleg V. Besov)

2000 Mathematics Subject Classification. 58Exx, 35Axx.

Keywords and phrases. Potential operators, variational principles, variational multipliers.

Abstract. A scheme for the construction of indirect variational formulations for a wide class of equations is suggested.

1. Introduction

An important problem in applications of variational methods is a representation of a given system of equations in the form of the Euler - Lagrange equations. It means the construction of a functional F_N such that its extremals are solutions of the given system of equations. This is known as the classical inverse problem of the calculus of variations [1,2,4,7].

In spite of the remarkable number of papers on the subject different approaches for constructing of integral variational principles for equations with nonpotential operators should be developed. They will allow to obtain so-called indirect variational formulations of given problems.

The main aim of the present paper is a constructive determination of indirect variational formulations for any operator equation with the Gâteaux differentiable operator N .

¹Supported by the Russian Foundation for Basic Research (grant no. 06-01-00341A and partially grant no. 05-01-00422A)