



ON SOME REPRESENTATIONS OF THE EQUATIONS OF MECHANICS

ALEXANDER BUROV

Department of Mechanics, A. A. Dorodnicyn Computing Centre of the Russian Academy of Sciences, 40 Vavilova Str., Moscow 119333, Russia

Abstract. The paper is devoted to extensions of the so-called Tatevsky equations, that can be used for description of mechanical phenomena.

1. Introduction

As is known from the analytical mechanics, the Lagrange equations are usually obtained from the Hamilton equations by the Legendre transformation with respect to impulses¹. And *vice versa*, the Legendre transformation with respect to velocities transforms the Lagrange equations into the Hamilton equations. The Legendre transformation with respect to a part of impulses (or velocities) allows to describe dynamics by equations known as the Routh equations. In [17, 18] two more classes of equations allowing to describe dynamics were proposed by V. Tatevsky. The equations from one class can be obtained from the Hamilton equations by the Legendre transformation with respect to the coordinates. Another class of equations can be obtained from the Hamilton equations by the Legendre transformation both with respect to coordinates and impulses. These equations have been studied later in [14, 15]. This is a reason, why in some publications they are indicated as Raitzin's equations. Further as a result of application of the Legendre transformation with respect to an arbitrary subset of arguments of the Hamilton function, an analogue of the Routh equations was discovered [9, 10].

Various properties of the Tatevsky equations are intensively studied in the modern scientific literature. For example, in [2] an analogue of the region of possible motions was studied, the equations of motion and the analogue of the Jacobi metrics

¹Here and below in this text in all cases when one speaks about the Legendre transformation, appropriate conditions of non-degeneracy are assumed to be fulfilled.