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CONSTRUCTION OF SYMPLECTIC-HAANTJES MANIFOLD OF CERTAIN HAMILTONIAN SYSTEMS

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Abstract. Symplectic-Haantjes manifolds are constructed for several Hamiltonian systems following Tempesta-Tondo [5], which yields the complete integrability of systems.

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1. Introduction

Tempesta-Tondo [5] introduces a concept of symplectic-Haantjes manifolds or $\omega\mathcal{H}$ manifolds and Lenard-Haantjes chain to treat completely integrable Hamiltonian system by means of the Haantjes tensor [2]. For a (1,2)-tensor field L, the Haantjes torsion $\mathcal{H}_L$ is given by Definition 1 below. If $\mathcal{H}_L$ vanishes, the tensor is called a *Haantjes operator*. In [5], Tempesta and Tondo showed that the existence of an $\omega\mathcal{H}$ manifold is a necessary and sufficient condition for a non-degenerate Hamiltonian system to be completely integrable. They showed an algorithm for solving the inverse problem, that is, for a given set of involutive functions, a Haantjes structure of the involutive functions is constructed by using Lenard-Haantjes chains.
In this note, using their method we construct $\omega\mathcal{H}$ manifolds for several Hamiltonian systems of two degrees of freedom such as so-called Fukaya system [1], a geodesic flow of two-dimensional Minkowski space and a system given by the