# Flat Coordinates and Hidden Symmetry for Superintegrable Benenti Systems

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*In this talk I present the results from my paper Exact solvability of superintegrable Benenti systems, J. Math. Phys. 48 (2007), 052114.*

*Keywords: superintegrability, Benenti system, Schrödinger equation, Hamilton-Jacobi equation, separation of variables.*

In [1] we deal with a class of superintegrable Hamiltonian systems on a $2n$-dimensional phase space with arbitrary natural $n$. This class is a natural generalization of the class presented in [2].

Using the results of [3] on flat coordinates for the metric tensors associated with the kinetic-energy parts of the Hamiltonians under study we show that for the two subclasses of the class in question there exist additional integrals of motion linear in momenta. In turn, the presence of these additional integrals enables us to solve the Hamilton-Jacobi and Schrödinger equations for the systems in question for arbitrary sufficiently large $n$.

The general theory is illustrated by an example of the Hamiltonian

$$H = \frac{1}{2}\sum_{j=1}^{n} p_j p_{n-j+1} + \frac{1}{2}\sum_{k=1}^{n-1} q^k \sum_{j=k+1}^{n} p_j p_{n+k-j+1} - q^3 + 2q^1 q^2 - (q^1)^3$$

## Acknowledgment

It is my great pleasure to thank Miloslav Znojil for the warm hospitality and the stimulating atmosphere of the microconferences.

The author would like to thank the Ministry of Education, Youth and Sports of the Czech Republic for supporting his participation at the microconference under grant MSM 4781305904.

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