

## Mathematics &gt; Differential Geometry

# On compatible metrics and diagonalizability of non-locally bi-Hamiltonian systems of hydrodynamic type

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We study bi-Hamiltonian systems of hydrodynamic type with non-singular (semisimple) non-local bi-Hamiltonian structures and prove that such systems of hydrodynamic type are diagonalizable. Moreover, we prove that for an arbitrary non-singular (semisimple) non-locally bi-Hamiltonian system of hydrodynamic type, there exist local coordinates (Riemann invariants) such that all the related matrix differential-geometric objects, namely, the matrix  $V^i_j(u)$  of this system of hydrodynamic type, the metrics  $g^{ij}_1(u)$  and  $g^{ij}_2(u)$  and the affinors  $(w_{1,n})^i_j(u)$  and  $(w_{2,n})^i_j(u)$  of the non-singular non-local bi-Hamiltonian structure of this system, are diagonal in these local coordinates. The proof is a natural consequence of the general results of the theory of compatible metrics and the theory of non-local bi-Hamiltonian structures developed earlier by the present author.

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