

Report on the research project

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Quasilinear PDEs and conformal structures in projective space

I continued the investigation of second order quasilinear equations of the form

$$f_{ij}u_{x_i x_j} = 0$$

where u is a function of n independent variables x_1, \dots, x_n , and the coefficients f_{ij} are functions of the first order derivatives $p^1 = u_{x_1}, \dots, p^n = u_{x_n}$ only. The following results were obtained during my stay in Trieste:

1. Differential-geometric conditions of the linearizability of such equations by a transformation from the equivalence group were obtained. These conditions are first order in the derivatives of the coefficients f_{ij} .
2. Further examples of conservation laws and dispersionless Lax pairs were calculated.

Details will appear in the journal version of the paper

P. A. Burovskii, E. V. Ferapontov and S. P. Tsarev, Second order quasilinear PDEs and conformal structures in projective space; arXiv:0802.2626v1, (2008).

I gave two presentations on the recent research of our group on second order quasilinear PDEs and equations of the dispersionless Hirota type. Moreover, we had detailed and constructive discussions with Prof Dubrovin on general aspects of the integrability in 2+1 dimensions, on 2+1 dimensional extensions of the known 1+1 dimensional hierarchies associated with the equations of associativity, and algebro-geometric aspects of equations of the dispersionless Hirota type. The program of further research in this area was also proposed.