INSTITUTUL DE MATEMATICĂ "SIMION STOILOW" AL ACADEMIEI ROMÂNE

Conferința lunară

Arithmetic analogue of some concepts in Riemannian geometry

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Abstract: Starting with a symmetric/antisymmetric matrix with integer coefficients (which we view as an arithmetic analogue of a metric/form on a vector bundle) we introduce arithmetic analogues of connections and curvature (in which usual partial derivative operators acting on functions are replaced by Fermat quotient operators acting on integer numbers). The Christoffel symbols turn out to be a matrix generalization of the Legendre symbol. We prove that the curvature of the connection attached to a matrix defining the split $SO(n)$ (respectively $Sp(n)$) does not vanish if n is at least 4. We also show that the curvature vanishes to order 3 for all n. Morally the integers are "curved" but only "mildly" curved. This and related results could be viewed as first steps in a program of developing an "arithmetic analogue of Riemannian/symplectic geometry".

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