

# Mixmaster model is associated to Borcherds algebra

Alexander Pavlov

Russian State Agrarian University - Moscow Timiryazev Agricultural Academy  
Timiryazevskaya street, 49  
Moscow, Russia

The problem of integrability of the mixmaster model as a dynamical system with finite degrees of freedom is investigated. The model belongs to the class of pseudo-Euclidean generalized Toda chains. It is presented as a quasi-homogeneous system after transformations of phase variables. An application of the method of getting of Kovalevskaya exponents to the model leads to the generalized Adler van Moerbeke formula on root vectors. A generalized Cartan matrix is constructed with use of simple root vectors in Minkowski space. The mixmaster model is associated to a Borcherds algebra. The known hyperbolic Kac Moody algebra of Chitre billiard model is obtained by using three space-like (without isotropic) root vectors.