GDIS 2014 – posters

Speaker	Title and abstract
Ivan Bizyaev	**On the nonintegrability and obstructions to the Hamiltonization of the nonholonomic Chaplygin top** This work continues a cycle of investigations of the problem of an inhomogeneous ball having a displaced center of mass and rolling without slipping and spinning. We consider in detail a particular case of the system studied in [1], where one of the quadratic integrals reduces to the linear one. It is shown that this system has no invariant measure, as before. However, the flow of the system is a superposition of two conformally Hamiltonian vector fields. [1] A. V. Bolsinov, A. V. Borisov, I. S. Mamaev, Rolling of a Ball without Spinning on a Plane: the Absence of an Invariant Measure in a System with a Complete Set of Integrals. Regul. Chaotic Dyn., 2012, 17, 6, 571–579;
Abdoul Salam Diallo	**Affine Osserman 3-manifolds** We report on some recent results on the study of ane Osserman manifolds. Special attention is paid to the three dimensional case.
Yuri Grigoryev	**Separation of variables for some systems with a fourth-order integral of motion** The separation variables for the generalized Kovalevskaya top and the generalized Chaplygin system on a sphere are presented. The method for constructing separation variables is based on finding the bi-hamiltonian structure by finding the additional Poisson bi-vector and then applying a trivial deformation.
Hildeberto Jardon	**Constrained Differential Equations and Slow Fast Systems** Constrained Differential Equations and Slow Fast systems are closely related. Several phenomena occurring in nature motivate their study, We extend the list of topological normal forms of constrained differential equations initially proposed by Takens in 1974. We want to be able to understand the geometric properties of slow fast systems near non-hyperbolic points.

Witold Mozgawa	**On Poncelet's closure theorem** We give a proof of Poncelet's closure theorem using only elementary functions and certain differential equation which has a solution with suitable geometric properties. We give a necessary and sufficient condition of existence of a constant solution of the equation which explains why the existence of a Poncelet polygon at one point of the annulus implies the existence of Poncelet polygon at an arbitrary point of the annulus. We will show that for n=3 a constant function is a solution of the differential equation if and only if the Chapple formula is satisfied.
Nicola Sansonetto	**(Linear) First Integrals in Nonholonomic Systems with Symmetry** In Hamiltonian mechanics a deep understanding of integrability is due to the link with symmetries. In nonholonomic mechanics the situation is different, less understood but (eventually) reacher. As a starting point one may wonder if, in the framework of nonholonomic mechanics there persists any relation, in any form, between symmetries and first integrals.
Tayebeh Vaezidadeh	**Entropy for Stochastic Process of the SIS and SIR Epidemic Models** We review some concepts in probability theory When the state space is finite and the stochastic process is Markov and the entropy of discrete random variables. Also the entropy for stochastic models will be introduced which determines the average uncertainty about outcomes of a random experiment and tell us that how much the expected outcomes are far from the real outcomes . Then will be computed the entropy of stochastic SIS and SIR epidemic models.
Tihomir Valchev	

Sathishkumar Perumal	**Magnetization switching through soliton flips in an inhomogeneous ferromagnet under the influence of electromagnetic wave** The study of magnetization reversal dynamics has become one of the most active fields of magnetism fuelled by the both scientific and technological interest. Today, the demand for information storage is enormous and expected to increase even further as new technologies. Magnetic reversal or switching is the process by which the magnetization of a specimen is changed from one stable direction into another. In practice it involves a rotation of the magnetization by 180◦, from one orientation along the easy axis to the opposite orientation, and this process is therefore referred to as magnetization reversal. Technologically, this is one of the most important processes in magnetism that is linked to the magnetic data storage process. Traditional way to reverse the magnetization is by an application of external magnetic field. In this switching process, the external field is applied in the direction opposite to the initial magnetization. However, the speed of switching relatively slow process which lies in the nanosecond regime is dominated either by domain nucleation processes or by domain wall propagation. In this connection, we present a method to reverse the magnetization through flipping of soliton in a one-dimensional site-dependent (inhomogeneous) bilinear ferromagnet under the influence of electromagnetic wave in the classical continuum limit and its associated dynamics is governed by the classical Landau-Lifshitz (LL) equation. Since the classical LL equation is a useful model to describe the magnetization reversal process in the magnetic system. The nonlinear spin dynamics is found to be governed by an inhomogeneous nonlinear Schrödinger (INLS) equation associated with Landau-Lifshitz equation coupled with Maxwell's equations. As the results of the multiple scale perturbation analysis on INLS equation, it is found that the velocity of the soliton exhibits magnetization reversal process through flipping of soliton in the nano-scale regime due to the presence of inhomogeneity in the form of linear function, whereas the amplitude of soliton remains constant during the course of time. Therefore, this flipping behavior of the soliton may give useful insight into the physical aspects of magnetization reversal and is expected to have potential applications in magnetic memory and recording. From the perturbed electromagnetic soliton solutions, it is noted that the perturbed electromagnetic soliton shows parabolic-soliton and semi-circular soliton nature under the influence of EM field. This peculiar behaviour of the soliton is due to interaction of EM field with inhomogeneous ferromagnetic medium. Finally, the magnetization of the medium and hence the magnetic field components of EM wave were constructed.