| Monday, 10th July 2023 | |
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| 9:30 – 10:20 | Robin Graham (University of Washington)<br>*Extrinsic GJMS Operators for Submanifolds*<br>The GJMS operators are a family of conformally covariant differential operators on Riemannian manifolds with principal part a power of the Laplacian. This talk will describe a construction and properties of an analogous family of operators associated to a submanifold of a Riemannian manifold. These are differential operators on the submanifold which depend on its extrinsic geometry and whose principal part is a power of the Laplcian in the induced metric. This is joint work with Jeffrey Case and Tzu-Mo Kuo. |
| 10:25 – 10:55 | Witold Respondek (INSA de Rouen and Lodz University of Technology)<br>*Quadratic nonholonomic constraints*<br>A quadratic nonholonomic constraint on a manifold X is the zero set of a polynomial of degree two in velocities thus defining a quadric in each fibre of the tangent bundle TX. We will study the geometry of quadratic nonholonomic constraints, their characterisations, and their classification by attaching to them their prolongations: a nonlinear control system (first prolongation) and a control-affine system (second prolongation). If X is a surface, that is, for n=2, we give an explicit characterisation of quadratic nonholonomic constraints and propose a classification by providing normal forms for elliptic, hyperbolic, and parabolic constraints. For an arbitrary n we study parabolic nonholonomic constraints. We also describe the cases, when a nonholonomic quadratic constraint is uniquely determined by symmetries of the control-affine system defined by the second prolongation of the constraint. The talk is based on joint research with Timothée Schmoderer (INRIA, France). |
| 10:55 – 11:30 | Coffee break |
| 11:30 – 12:20 | Ian Anderson (Utah State University)<br>*Intransitive Symmetry Groups of 2-Plane Distributions and Darboux Integrable f-Gordon Equations*<br>In this talk I will describe a new, transformation group theoretic, approach to the classification of Darboux integrable partial differential equations of the type u_xy= f(x, y, u, u_x, u_y). Such equations are commonly referred to in the literature as f-Gordon equations, generalized wave map equations, or equations of Liouville type. The main result of this group theoretic approach is that a complete list of all f-Gordon equations which are Darboux integrable at order 3 can be determined from a complete list of rank 2 distributions in 5 dimensions which admit intransitive 5-dimensional symmetry groups. In this way, the study of Darboux integrable f-Gordon equations is tied, quite remarkably, to Cartan's celebrated 1910 paper. Through this correspondence, we uncovered a new class of Daboux integrable equations and thereby obtain a complete classification of all Darboux integrable equations at order 3. This talk is based upon joint work with Brandon P. Ashley, Southern Oregon University. |
| 12:25 – 12:55 | Eivind Schneider (UiT The Arctic University of Norway)<br>*Finding ODEs that are invariant under a given Lie algebra of vector fields*<br>Through examples I will discuss the problem of finding ODEs and ODE systems that are invariant under a given Lie algebra of vector fields. We approach this problem by considering the prolonged Lie algebra action on appropriate jet spaces. While the generic ODE systems can be given in terms of (scalar) absolute differential invariants, the task of finding all invariant systems requires us to also compute relative differential invariants, conditional differential invariants and vector-valued differential invariants. This talk is based on joint work with B. Kruglikov and the examples are taken from our paper "ODEs whose symmetry groups are not fiber-preserving". |
| 12:55 – 15:00 | Lunch break |
| 15:00 – 15:50 | Katarzyna Grabowska (University of Warsaw)<br>*Contact geometry as a chapter of symplectic geometry*<br>During the talk, I will present a novel approach to contact geometry. According to this approach, contact structures should not be seen as "odd-dimensional generalizations" of symplectic geometry, but rather as specific examples of symplectic geometry. Specifically, we consider them as homogeneous symplectic principal bundles with an action of the multiplicative group of non-zero real numbers. In this framework, we are able to construct contact Hamiltonian vector fields even in cases where a global contact form does not exist on the contact manifold under consideration. The use of the homogeneous symplectic language is also well-suited for applications in contact Hamilton-Jacobi theory and contact reductions. This talk is based on collaborative work with Janusz Grabowski. |
| 15:55 – 16:25 | Boris Doubrov (Belarusian State University)<br>*Extrinsic geometry and linear differential equations of sl3-type*<br>As an application of the general theory on extrinsic geometry, we investigate extrinsic geometry in frag varieties and systems of linear PDE's for a class of special interest associated with the adjoint representation of sl(3). We carry out a complete local classification of the homogeneous structures in this class. As a result, we find 8 kinds of new systems of linear PDE's of second order on a 3-dimensional contact manifold each of which has a solution space of dimension 8. Among them there are included a system of PDE's called contact Cayley's surface and one which has sl(2) symmetry. |
| 16:25 – 16:45 | Coffee break |
| 16:45 – 17:35 | Daniel Fox (Universidad Politécnica de Madrid)<br>*Curvature equations for statistical structures*<br>Statistical structures are a generalization of metric structures that generalize structure occurring naturally on hypersurfaces in affine space. The talk will propose a hierarchy of curvature equations coupling a metric with an auxiliary tensor satisfying certain PDEs and generalizing the usual constant curvature - Einstein - constant scalar curvature hierarchy. For pairs comprising a metric and a rank three symmetric Codazzi tensors this yields curvature equations for statistical structures. Examples of solutions originating in the geometry of submanifolds, study of flat projective structures, and algebra will be described. |
| 17:40 – 18:10 | Ben Warhurst (University of Warsaw)<br>*Jets spaces on Stratified Groups*<br>The talk will discuss recent work with Sebastiano Nicolussi Golo concerning a stratified group structure on the adapted jets of vector valued functions on stratified groups. |