PROGRAMME OF WORKSHOP ON GEOMETRY AND TOPOLOGY OF THREE-DIMENSIONAL MANIFOLDS, NOVOSIBIRSK, AUGUST 16–29, 2005

INVITED TALKS

MATVEEV SERGUEI (CHELYABINSK)
"Recognition of manifolds"

ZIMMERMANN BRUNO (TRIESTE)
"Some results and conjectures on finite groups acting on homology spheres"
    We present some recent results and related conjectures on finite groups acting on integer and mod 2 homology spheres, mainly in dimensions 3 and 4.

MOLNAR EMIL (BUDAPEST)
"On projective models of Thurston geometries (some relevant problems)"
    The eight homogeneous Thurston 3-geometries $\mathbb{E}^3, \mathbb{S}^3, \mathbb{H}^3, \mathbb{S}^2 \times \mathbb{R}, \mathbb{H}^2 \times \mathbb{R}, \widetilde{SL(2,\mathbb{R})}, Nil$, Sol by their projective interpretation are given. Complete classification of tile-transitive 3-simplex tilings in Thurston geometries in terms of the Delone – Delaney – Dress symbols is obtained.

MULAZZANI MICHELE (BOLOGNA)
"Representations of (1,1)-knots"
    We develop two different representations of $(1, 1)$-knots and study the connections between them.

TETENOV ANDREI (GORNO-ALTAISK)
"On the rigidity of one-dimensional systems of contraction similitudes"
    Our main result is that any continuous map $\varphi : K(S) \to K(T)$ of the attractor of the system S to the attractor of the system of contraction similitudes T which agrees with

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the structure of self-similar set on the sets $K(S)$ and $K(T)$ is a linear map of $[0,1]$ to a straight line segment.

METZLER WOLFGANG (FRANKFURT)
"Strategies towards a Disproof of the General Andrews Curtis Conjecture"
    In the talk I will give a summary on several approaches towards a disproof of the General Andrews-Curtis Conjecture: I) there exist potential counterexamples in the relative case modeled on commutator calculus, and also our partial results on invariants could be carried on in these terms. II) Together with us and with Carsten Cleve, Timo Stey succeeded in defining a reduced Turaev-Viro type invariant for 3-deformations of 2-complexes for every prime. We don't expect that already a single of these invariants actually distinguishes between different Q^{**}-classes, but simultaneous congruences might do so. This section of the talk is related to the one of Simon King. III) Recently Borovik, Lubotzky and Myasnikov have shown for the ordinary AC-problem that any test for Q-inequivalence into a finite test group must die. By the thesis of Klaus Mueller, the fact has consequences for Quinn's approach. IV) Alexander Kuehn and I have started to take up the study of characterizing Andrews Curtis classes by their Q-stabilizer groups.

PERVOVA EKATERINA (CHELYABINSK) AND PETRONIO CARLO (PISA)
"On the existence of branched coverings between surfaces with prescribed branch data"
    Given a branched covering between closed connected surfaces, one can easily establish some relations between the Euler characteristic and orientability of the involved surfaces, the degree of the covering, the number of branching points, and the local degrees at these points. These relations can therefore be regarded as necessary conditions for the existence of the covering. The classical Hurwitz problem asks whether the necessary conditions are actually also sufficient. Thanks to the work of many authors, the problem is now completely solved (in the positive) when the base surfaces has non-positive Euler characteristic. The cases where the base surface is the sphere or the projective plane remain elusive, but many partial results are known. In the talk I will state several new existence and non-existence results, and I will mention the diverse algebraic and geometric methods employed to establish them.

GORDON CAMERON (AUSTIN)
"Algebraic knots with unknotting number 1"
    A Conway sphere S for a knot K is a 2-sphere that meets K transversely in four points. S is essential if $S - K$ is incompressible in $\mathbb{S}^3 - K$. Our main result is that if a knot K with an essential Conway sphere has unknotting number 1 then either the unknotting move can be isotoped to miss the canonical Bonahon-Siebenmann family of such spheres, or K belongs to the family of knots constructed by Eudave-Munoz, or K contains a tangle summand belonging to an analogous family. This gives very strong conditions on when an algebraic knot, that is not a Montesinos knot of length 3, has unknotting number 1. In particular, it leads to an algorithm to determine whether or not such a knot has unknotting number 1. (Joint work with John Luecke.)

VERSHININ VLADIMIR (MONTPELIER - NOVOSIBIRSK)
"Braids: generalizations, presentations and algorithmic properties"
    Classical braid groups admit several types of presentations. The analogues of these presentations are obtained for the genralizations of braid groups. Garside algorithm for the word problem also works for the singular braid monoid.

BARDAKOV VALERIJ (NOVOSIBIRSK)
"Virtual and welded links and their invariants"

There is a linear representation $\varphi : PW_n \longrightarrow GL_n(Z[t_1^{\pm 1}, t_2^{\pm 1}, \ldots, t_n^{\pm 1}])$, which is an extension of the Gassner representation of the pure braid group P_n. This representation has a non-trivial kernel for every $n \geq 2$.

PERFIL'EV ANDREY (CHELYABINSK)
"Minimal Seifert manifolds"
    Denote by S(n) the number of closed orientable Seifert manifolds of complexity n. We suggest an explicit formula for S(n) and investigate its asymptotic behavior.

KING SIMON (DARMSTADT)
"On new 3-manifold invariants"
    We define new invariants of Turaev-Viro type based on the Groebner basis of the corresponding normal system and apply them to distinguishing 3-manifolds given by their special spines.

SHARAFUTDINOV VLADIMIR (NOVOSIBIRSK)
"Variation of the Dirichlet-to-Neumann operator for Riemann metrics"

CHUESHEV VIKTOR (KEMEROVO)
"Filtration method in the Jacobi manifold and multiplicative Weierstrass points"
    Riemann–Roch theorems are obtained for the spaces of Prim differentials on compact Riemann surfaces.

FOMINYKH EVGENII (CHELYABINSK) AND OVCHINNIKOV MIKHAIL (CHELYABINSK)
"On complexity of graph-manifolds"
    We provide a new formula for an upper bound of the complewity of non-Seifert graph-manifolds obtained by gluing together two Seifert manifolds fibered over the disc with two exceptional fibers. This bound turns out to be sharp for many manifolds.

SHORT COMMUNICATIONS

DEREVNIN DMITRY (TYUMEN')
"Volume formulas for tetrahedra in Lobachevsky space"
    New volume formulas for tetrahedron in the Lobatchevskij space are obtained.

GLOCK JANINA (FRANKFURT)
"2-Complexes in 3-manifolds"
    We investigate to which extent a 2-complex in a 3-manifold determines its regular neighbourhood. We describe several obstructions to uniqueness and prove that if they vanish, then the regular neighborhood is unique.

PENZAVALLE SIMONE (PISA)
"Heegaard splitings of twisted bundles"
    We prove that orientable 3-manifolds that admit a non-orientable I-bundle structure over a nonorientable surface have only one irreducible Heegaard splitting. By making use of this result we characterize splittings of orientable Seifert spaces whose fibration is not orientable.

BRUKHANOV OLEG (NOVOSIBIRSK)
"On residually nilpotentness of fundamental groups of 3-dimensional Sol-manifolds"
    Residually nilpotentness of fundamental groups of 3-dimensional Sol-manifolds is investigated.

ISANGULOV RUSLAN (NOVOSIBIRSK)
"Isospectral flat orientable 2-orbifolds"

There is a well-known problem about isospectrality of Riemannian manifolds: whether isospectral manifolds are isometric. In this paper we extend this problem to Riemannian orbifolds and give an answer in case of compact flat orientable two-dimensional orbifolds.

ABROSIMOV NIKOLAY (NOVOSIBIRSK)
"On Chern–Simon invariants of geometric 3-manifolds"
In the present talk we investigate *the Chern–Simons invariant* of a Whitehead link cone-manifold $W(\alpha, \beta)$ with cone angles α and β along the link components. An explicit formulas for *a generalized Chern–Simons function $I\ W(\alpha, \beta)$* in hyperbolic and spherical cases are obtained. *The Chern-Simons invariant $CS(\mathbb{S}^3, W, n, m)$ of orbifold $W\ \left(\dfrac{2\pi}{n}, \dfrac{2\pi}{m}\right)$* is also found.

SBRODOVA ELENA (CHELYABINISK)
"An algorithm for finding of planar surfaces in 3-manifolds"
We describe an algorithm to decide if a given 3-manifold with boundary contains a proper essential flat surface. In contrast to previous results of different authors, we admit arbitrary boundary, maybe disconnected. We apply the obtained results to the problem of exceptional surgeries.

SHATNYKH OLESYA (CHELYABINSK)
"The extended complexity of 3-manifolds"
By *the complexity* of 3-manifold M we mean the number of true vertices of a minimal almost simple spine of M. Denote by M_F the 3-manifold obtained by cutting M along a proper surface F. We investigate the relation between the complexity of M and the complexity of M_F.

KORABLEV FILIPP (CHELYABINSK)
"Genus 3 Heegaard diagrams"