Block-Building & Deformations of Polyhedra, Group Homomorphisms and Quasiregular Mappings

Boris N. Apanasov
(University of Oklahoma)

Abstract

We discuss our method of block-building of conformal polyhedra in the 3-sphere, their "bending" deformations and several applications to geometry, topology and geometric analysis. This is related to varieties of conformal structures on closed hyperbolic 3-manifolds, to the shape of non-trivial compact 4-dimensional cobordisms M (cf. [1], [4]) whose interiors have complete hyperbolic structures (how the global geometry and topology of such cobordisms depends on properties of the variety of discrete representations of the fundamental group of its boundary ∂M -cf. [2, 3]), to different ergodic actions of a uniform hyperbolic 3-lattice [6], as well as to M.A.Lavrentiev problem on locally homeomorphic quasi-regular mappings in 3-space [7]. This gives also a new view on Andreev's hyperbolic polyhedron theorem.

[1]   Boris Apanasov and Andrei Tetenov, *Nontrivial cobordisms with geometrically finite hyperbolic structures*, J. of Diff. Geom. **28** (1988), 407-422.

[2]   Boris Apanasov, *Nonstandard uniformized conformal structures on hyperbolic manifolds.* - Inventiones Mathematicae, **105:1** (1991), 137-152.

[3]   Boris Apanasov, *Conformal geometry of discrete groups and manifolds.* - De Gruyter Expositions in Math. **32**, W. de Gruyter, Berlin - New York, 2000, XIV + 523 pp.

[4]   Boris Apanasov, *Quasisymmetric embeddings of a closed ball inextensible in neighborhoods of any boundary points*, Ann. Acad. Sci. Fenn., Ser. AI **14:2** (1989), 243-255.

[5]   Boris Apanasov, *Hyperbolic 4-cobordisms and group homomorphisms with infinite kernel.* - Atti Semin. Mat. Fis. Univ. Modena Reggio Emilia, **57**, 2010, 31-44.

[6]   Boris Apanasov, *Group Actions, Teichmuüller Spaces and Cobordisms.* - Lobachevskii J. Math., **38:2**, (2017), 213–228.

[7]   Boris Apanasov, *Topological barriers for locally homeomorphic quasiregular mappings in 3-space.* - to apppear, http://arxiv.org/abs/1510.08951.