A BRIEF HISTORY OF THE DEPARTMENT OF GEOMETRY BETWEEN ANNIVERSARIES 40 AND 50

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Our Department was founded in 1952. We celebrated our 25th and 40th anniversaries with extra volumes of the Periodica Polytechnica. Below we indicate some important events of the past 10 years in the life of our Department in education, in science and organization.

1993-94: Introduction of the Credit System at BME. This brought a lot of work. We had to transform our courses, change their contents and change our teaching methods.

1996, July 1. Foundation of the Institute of Mathematics with 5 departments, the Department of Geometry among them, in the Faculty of Social and Natural Sciences.

2000, January 1. Renaming the University as Budapest University of Technology and Economics. Our new Faculty of Natural Sciences had three parts, one of which was our Institute of Mathematics.

Our Department has been teaching the first semester courses: Geometry for mechanical engineering students, Descriptive Geometry for production engineers, moreover, extra for civil engineering students. For these students we provide laboratory classes in smaller groups, and various facultative subjects. Since 1997 we have been taking part in teaching basic courses of mathematics for engineers.

September 1996, the first year of the undergraduate (applied) mathematician program. We teach these students Geometry and Differential Geometry with seminars in 3 semesters.

We lead specialization direction in the 4 upper semesters, in rotation:

1. Models of Geometries, Space Concepts in Physics and Geometry.
2. Computer Aided Geometric Modelling. Spline Modelling of Curves and Surfaces.
3. Discrete Geometry. Combinatorial Geometry.
4. Chapters of Global Differential Geometry. Differentiable Group Actions.

These reflect also the scientific research interest of our colleagues. We accept PhD students in these topics. 4 colleagues defended their PhD dissertations in the period, and there were 3 habilitations (Dr. habil. procedure).

We have been participating in international conferences, in study trips, many times as invited speakers. The Department organized the international conference "Konstruktive Geometrie" at Balatonföldvár in Hotel Jogar 1993, 95, 98, 2001. We keep fruitful scientific contacts with Universities of Berlin, Bielefeld, Bratislava, Beograd, Dresden, Graz, Jena, Kishinev, Moscow, Novosibirsk, Potsdam, Praha, Wien, Zagreb and others.

We won some projects from the Ministry of Education and 3 research projects from National Foundation of Scientific Research (OTKA). Our last international project is DAAD-TÉT D-4/99 intending to develop a computer program package to CARAT (RWTH Aachen) for modelling crystallographic space groups by poly-hedra.

The staff of the department changed by the time. We are happy to greet our oldest colleague, Endre Pethes, and our former head of the department István Reiman, who celebrated their 80th and 75th birthday this year, respectively. László Verhóczki and Pál Ledneczki went to other departments into higher position. We keep working contact with them.

We remember our deceased collegues:

Professor Gyula Strommer (1920–1995), head of our department (1952–1986);
Senior assistant György Hável (1929–2001), the coordinator of engineer educa-
     tion;
Professor Imre Vermes (1940–2002), the author of many educational scriptums,
     enthusiastic researcher of the hyperbolic geometry of János Bolyai. He died
     on August 21st of this year.
   We cherish their memory.

Our new colleagues are associate professor András Szenes and assistant Brigitta Szilágyi. Mrs Mária Izay was followed by Mrs Mária Farkas-Hegedűs as departmental administrator.

Below we collected the scientific works of the present staff of our Department from this period. For the earlier history of the department and previous publications we refer to *Periodica Polytechnica, Ser. Mech. Engrg.* **36**, No. 3–4 (1992).

Dr habil Emil Molnár, head of department
(working here from 1990)

1. On a family of four-dimensional simplex tilings and its d-dimensional variant. *Publicationes Math. Debrecen* **46**/3-4 (1995), pp. 239–269.

2. Non-geometric good orbifolds. *Bolyai Society Math. Studies,* **4** *Topology with Applications,* Szekszárd (Hungary) 1993, pp. 351–378, (1995).

3. Discontinuous groups in homogeneous Riemannian spaces by classification of D-symbols. *Publicationes Math. Debrecen,* **49**/3-4 (1996), pp. 265–294

4. Díszítések a hiperbolikus síkon és „térben". Bolyai János emlékülés, születése 190. évfordulója alkalmából. Kolozsvár 1992 december 18. *Múzeumi füzetek,* az Erdélyi Múzeum-Egyesület Természettudományi és Matematikai Szakosztálya Közleményei, Új Sorozat **3** (1994), pp. 16–30, Kolozsvár 1994.

5. (with J. Szirmai) Einige Pflasterungen des hyperbolischen Raumes mittels flächentransitiver Bewegungsgruppen. *Annales Univ. Sci. Budapest, Sect. Math.* **38** (1995), pp. 95–108.

6. The projective interpretation of the eight 3-dimensional homogeneous geometries. *Beiträge zur Algebra und Geometrie (Contributions to Algebra and Geometry)* **38** (1997), No. 2, pp. 261–288.

7. (with I. Prok and J. Szirmai) Classification of solid transitive simplex tilings in simply connected 3-spaces, Part 2. Metric realizations of the maximal simplex tilings. *Periodica Math. Hung.* **35** (1-2), (1997), pp. 47–94.

8. (with A. Bölcskei) Graphische Realisierung der homogenen Dreieckpflasterungen in $\mathbf{S}^2$, $\mathbf{E}^2$, und $\mathbf{H}^2$. *Geometrie-Tagung "107 Jahre Drehfluchtprinzip"* Vorau (Österreich) 1997, pp. 11–20, (1999).

9. (with I. Prok and J. Szirmai) Two families of fundamental 3-simplex tilings and their realizations in various 3-spaces, *Proceedings of the Int. Sci. Conf. on Math.* Vol. **2** Zilina (Slovakia 1998) pp. 43–64.

10. (with A. Bölcskei) How to design nice tilings? *KoG.* **3** (Zagreb, 1998), pp. 21–28.

11. (with I. Prok and J. Szirmai) The Gieseking manifold and its surgery orbifolds, *Novi Sad J. Math.* Vol. **29**, No. 3, (1999) pp. 187–197, XII. Yugoslav Geometric Seminar, Novi Sad, October 8–11. 1998.

12. (with I. Prok and J. Szirmai) Classification of hyperbolic manifolds and related orbifolds with charts up to two ideal simplices, *Topics in Algebra, Analysis and Geometry, Gyula Strommer National Memorial Conference, Balatonfüred (Hungary)* 1999, pp. 293–315.

13. (with A. Bölcskei) On classification of tilings in the planes of constant curvature by D-symbols, *Proc. of the 4th Int. Conf. of Appl. Informatics,* Eger–Noszvaj (Hungary) 1999, pp. 117–128.

14. Minimal surfaces and crystallography, *Proc. 25. Süddt. Differentialgeometrie-Kolloquium,* 02.06.2000, Inst. für Geometrie, TU Wien, pp. 47–70 (2001).

15. (with J. Z. Farkas) Similarity and diffeomorphism classification of $\mathbf{S}^2 \times \mathbf{R}$ manifolds, *Steps in Diff. Geometry, Proc. of Coll. on Diff. Geom.* 25–30 July 2000. Debrecen (Hungary), pp. 105–118, (2001), http://www.emis.de/proceedings.

16. (with T. Schulz and J. Szirmai) Periodic and aperiodic figures on the plane by higher dimensions, *J. Geometry and Graphics,* Vol.**5** (2001), No. 2, pp. 133–144.

17. On triply periodic minimal balanced surfaces, *Structural Chemistry, Generalized Crystallography,* to 75th anniv. of A. L. Mackay; Vol.**13** (2002), Nos. 3–4, pp. 267–275.

18. (with I. Prok and J. Szirmai) Bestimmung der transitiven optimalen Kugelpackungen für die 29 Raumgruppen, die Coxetersche Spiegelungsuntergruppen enthalten, *Studia Sci. Math. Hung.* **39** (2002) pp. 443–483.

19. (with L. Ács) Algorithm for D-V cells and fundamental domains, $\mathbf{E}^4$ space groups with broken translations in the icosahedral family. *J. Geometry and Graphics,* **6** (2002), No. 1. pp. 1–16

Dr. habil Márta Szilvási-Nagy, associate professor (1974-)

1. On the visibility of composite, self-intersecting polyhedral models. *International Conference on Applied Informatics, Eger, Hungary*(23-26 August 1993) pp. 61–68.

2. CAD-iskola a geometria oktatásban. *Informatika a felsőoktatásban országos konferencia, Debrecen* (1993 Szept. 1-3.) pp. 834–839.

3. A new numerical method in surface modelling. *microCAD'95 International Comp. Sci. Conference, Miskolc, Hungary* (Febr 23, 1995) pp. 31–34.

4. Tubular NURB surfaces with boundary control. *Math. Pannonica* **6**/2 (1995) pp. 217–228.

5. A solution of fitting problems for B-spline surfaces. *7th International Conference on Engineering Computer Graphics and Descriptive Geometry, Cracow, Poland* (18-22 July, 1996) pp. 221–223.

6. Shaping and fairing of tubular B-spline surfaces. *Computer Aided Geometric Design* **14** (1997) pp. 699–706.

7. Flexible methods of surface design with FastSURF. *Per. Pol. Mech. Engrg.* **41** (1997) pp. 119–131.

8. (with M. Kmetová) Sphere covering by rational quadratic Beziér patches, *KoG, Information Journal of Croatian Society of Constructive Geometry and Computer Graphics*, **2** (1997) pp. 5–8.

9. Almost curvature continuous fitting of B-spline surfaces, *Journal for Geometry and Graphics*, **2** (1998) No. 1, pp. 33–43.

10. Closing pipes by extension of B-spline surfaces, *KoG, Information Journal of Croatian Society of Constructive Geometry and Computer Graphics*, **2** (1998) pp. 13–19.

11. (with T. P. Vendel) Generating curves and swept surfaces by blended circles, *Computer Aided Geometric Design*, **17** (2000) pp. 197–206.

12. Modelling the suit-case corner with B-spline surface, *4th International Conference on Applied Informatics, Eger-Noszvaj, Hungary* (30. Aug.–3.Sept. 1999.) pp. 1–8.

13. Shaping Effect of Fairing Functions. *Topics in Algebra, Analysis and Geometry, Gyula Strommer National Memorial Conference, Balatonfüred* (1999) pp. 329–342.

14. Konstruktion von Verbindungsflächen mittels trigonometrischer Bindefunktionen, *25. Süddeutsches Differentialgeometrie-Kolloquium,* (Juni 2000. Wien) pp. 71–78.

15. On a surface construction, *Proceedings of symposium on computational geometry SCG'2001,* (Sept. 2001, Kocovce, SR) **10**, pp. 130–135.

16. (with T. P. Vendel) A Coons type construction with surfaces, *I. Magyar Számítógépes Grafika és Konferencia,* (Budapest, 2002. május 28-29.) pp. 44–47.

17. (with T. P. Vendel and H. Stachel) Filling gaps by convex combination of surfaces, *KoG, Information Journal of Croatian Society of Constructive Geometry and Computer Graphics* **6** (2001/02) pp. 1–8.

18. Filling holes with B-spline surfaces, *Journal for Geometry and Graphics*, **6** (2002) pp. 83–98.

19. Geometriai modellezési eljárások. Habilitációs tézisek. Debrecen 2001.

Book:

1. *CADKEY gyakorlókönyv.* Műegyetemi Kiadó 1997 Budapest.

Dr. Ákos G. Horváth, associate professor (1984–)

1. *N-rácsok minimális vektorai.* Kandidátusi értekezés 1993.

2. Some remarks connected with G. Csóka's paper "On an extremal property of Minkowski-reduced forms". *Studia Sci. Math. Hung.* **29** (1994), pp. 67–70.

3. (with E. Molnár) Densest ball packings by orbits of the 10 fixed point free Euclidean space groups. *Studia Sci. Math. Hung.* **29** (1994), pp. 9–23.

4. On the coordinates of minimum vectors in N-lattices. *Studia Sci. Math. Hung.* **29** (1994), pp. 169–175.

5. On the number of the minima of N-lattices. *Colloquia Math. Soc. J. Bolyai 63. Intuitive Geometry, Szeged (Hungary)*, (1991), 161–172.

6. On Dirichlet-Voronoi cell. Part I. Classical problems. *Per. Poly. ser Mech. Eng.* **39.** (1995), pp. 25–42.

7. On the sublattices of the Barnes-Wall lattice. *Periodica Math.* **31**(2) (1995), pp. 131–138.

8. On a problem connected with the weight distribution of the Reed-Muller code of order r. *Annales Univ. Sci. Math.* **38** (1995), pp. 171–176.

9. On the Dirichlet-Voronoi cells of the unimodular lattices. *Geometriae Dedicata* **63** (1996), pp. 183–191.

10. On the dissections of a centrally symmetric hexagon. *Bolyai Soc. Mathematical Studies 6. Intuitive Geometry, Budapest 1995* (1997) 327–334.

11. Correction of my paper "On double-latticelike spheherepacking". *Annales Univ. Sci. Math.* **39** (1996), pp. 101–105.

12. Extremal polygons with minimal perimeter. *3rd Geometry Festival, Congress Proceeding, Periodica Mathematica Hungarica* **34** (1-2) (1997), pp. 81–90.

13. Lower bounds of the maximal coordinates of minimum vectors. *4th International Congress of Geometry, Congress Proceeding* Thessaloniki (1996), pp. 179–187.

14. On Dirichlet-Voronoi cell. {Part II. Diagrams} *Per. Poly. ser Mech. Eng.* **41/2** (1997), 95–117.

15. On the boundary of an extremal body. *Berträige zur Algebra und Geometrie* **40/2** (1999), pp. 331–342

16. On the bisectors of a Minkowski normed space. *Acta Math. Hung.* **89(3)** (2000), pp. 417–424

17. (with I. Prok) Packing congruent bricks into a cube, *Journal for Geometry and Graphics,* **5** (2001), No. 1,pp. 1–11.

Dr. Jenő Szirmai, associate professor (1992–)

1. Typen von flächentransitiven Würfelpflasterungen, *Annales Univ. Sci. Budapest, Sect. Math.* **37** (1994), pp. 171–184.

2. Über eine unendliche Serie der Polyederpflasterungen von flächentransitiven Bewegungsgruppen, *Acta Math. Hungarica*, **73(3)** (1996), pp. 247–261.

3. (with E. Molnár and I. Prok): Classification of solid transitive simplex tilings in simply connected 3-spaces, Part II. Metric realizations of the maximal simplex tilings, *Periodica Mathematica Hung.* **35(1-2)** (1997) pp. 47–94.

4. (with E. Molnár): Einige Pflasterungen des hyperbolischen Raumes mittels flächentransitiver Bewegungsgruppen, *Annales Univ. Sci. Budapest, Sect. Math.* **38** (1995), pp. 95–108.

5. Metrische Realisierungen von zwei Familien der dreidimensionalen körpertransitiven Symplexpflasterungen, *Annales Univ. Sci. Budapest, Sect. Math.* **39** (1996), pp. 145–162.

6. Optimale Kugelpackungen für die Raumgruppen **F23, P432** und **F432**, *Periodica Polytechnica Ser. Mech. Eng.* **36**, (1992), pp. 317–331.

7. Optimale Kugelpackungen unter einigen Raumgruppen, *Alkalmazott Matematikai Lapok* **17** (1996), pp. 87–99.

8. Ein Computeralgorithmus für die Bestimmung der einfach transitiven optimalen Kugelpackungen unter zum Würfelsystem gehörigen Raumgruppen, *Proceedings of 3rd International Conference on Applied Informatics Eger–Noszvaj, Hungary,* (1997), pp. 285–301.

9. (with Cs. Máté): Determination of densest ball packings under cubic crystallographic groups by computer *Alkalmazott Matematikai Lapok,* **19** (1999), pp. 87–111.

10. (with E. Molnár and I. Prok): Two families of fundamental 3-simplex tilings and their realizations in various 3-spaces, *Proceedings of International Scientific Conference of Mathematics, Zilina, Slovakia.* **vol 2** (1998) pp. 43–64.

11. (with E. Molnár and I. Prok): Gieseking manifold and its surgery orbifolds, *Novi Sad, Journal of Mathematics,* **29** (1999) 187–197.

12. (with E. Molnár and I. Prok): Classification of hyperbolic manifolds and related orbifolds with charts up to two ideal simplices, *Topics in Algebra, Analysis and Geometry, Gyula Strommer National Memorial Conference, Balatonfüred (Hungary)* 1999, pp. 293–315.

13. (with E. Molnár and T. Schulz): Periodic and aperiodic figures on the plane by higher dimensions, *Journal for Geometry and Graphics,* **5 No. 2** (2001) pp. 133–144.

14. (with E. Molnár and I. Prok): Bestimmung der transitiven optimalen Kugelpackungen für die 29 Raumgruppen, die Coxetersche Spiegelungsuntergruppen enthalten, *Studia Sci. Math. Hungarica,* **39** (2002) pp. 443–483.

15. Kombinatorikus térkikövezések metrikus realizációi a hiperbolikus térben, *PhD értekezés,* BME, Budapest (1997)

Dr. András Szenes, associate professor (2002-)

1. (with P. Roche): Trace functionals on non-commutative deformations of moduli spaces of flat connections *Advances in Mathematics* **168**, 133–192 (2002), arXiv:math.QA/0008149.

Dr. Gábor Molnár-Sáska, senior assistant (1974–)

1. A practical approach to the affine transformations of the Euclidean plane. *Per. Pol. Mech. Engrg.* **39** (1995), pp. 61–78.

2. (with K. Molnár-Sáska and Gy. Nagy), The Geometry in the Engineering Education, *Proceeding of Theaching Mathematics for Engineering Students* (1999) 29–33.

3. (with K. Molnár-Sáska and Gy. Nagy), The Engineering Education and the Geometry, *Annual News Szent István University* (2000) pp. 24–27.

Dr. István Prok, senior assistant (1988–)

1. Fundamental tilings with marked cubes in spaces of constant curvature. *Acta Math. Hung.* **71 (1–2)** (1996), pp. 1–14.

2. Application of a polyhedron algorithm for finding regular polyhedron tilings, *Proceedigs of The 7th International Conference on Egineering Graphics and Descriptive Geometry 1996, Cracow, Poland,* pp. 300–304.

3. (with E. Molnár and J. Szirmai) Classification of solid transitive simplex tilings in simply connected 3-spaces. II. Metric realizations of the maximal simplex tilings. *Periodica Math. Hung.* **35** (1-2), (1997), pp. 47–94.

4. Discrete transformation groups and polyhedra by computer *Proceedings of Special SEFI European Seminar on Geometry in Engineering Education, 1997, Smolenice, Slovakia,* pp. 139–145.

5. Classification of dodecahedral space forms. *Beiträge zur Algebra und Geometrie* **39** (1998), No. 2, pp. 497–515.

6. (with E. Molnár and J. Szirmai) Two families of fundamental 3-simplex tilings and their realizations in various 3-spaces, *Proceedings of the Int. Sci. Conf. on Math.* Vol. **2** (Zilina, Slovakia 1998) pp. 43–64.

7. (with E. Molnár and J. Szirmai) The Gieseking manifold and its surgery orbifolds, *Novi Sad, Journal of Math.* **29** No. 3 pp. 187–197.

8. (with E. Molnár and J. Szirmai) Classification of hyperbolic manifolds and related orbifolds with charts up to two ideal simplices, *Topics in Algebra, Analysis and Geometry, Gyula Strommer National Memorial Conference, Balatonfüred (Hungary)* 1999, pp. 293–315.

9. (with Á. G. Horváth) Packing congruent bricks into a cube, *Journal for Geometry and Graphics,* **5** (2001), No. 1, pp. 1–11.

10. (with E. Molnár and J. Szirmai) Bestimmung der transitiven optimalen Kugelpackungen für die 29 Raumgruppen die Coxetersche Spiegelungsuntergruppen enthalten *Studia Sci. Math. Hung.* **39** (2002) pp. 443–483.

11. Alaptartományszerű kövezések állandó görbületű terekben szabályos poliéderekkel, *PhD értekezés,* BME, Budapest, 2000.

Dr. Attila Bölcskei, senior assistant (1999–)

1. On weakly-neighbourly polyhedra, *Studia Sci. Math. Hung.* **36** (2000), pp. 111–121.

2. Classification of unilateral and equitransitive tilings by squares of three sizes, *Beiträge zur Algebra und Geometrie (Contributions to Algebra and Geometry),* **41** (2000), pp. 267–277.

3. Plane fundamental domains with minimal perimeters, *Periodica Math. Hung.* **40** (2) (2000) pp. 147–165.

4. Filling space with cubes of two sizes, *Publ. Math. Debrecen* **59/3-4** (2001), pp. 317–326.

5. Constructive Geometry with Computer, *Proceedings of Teaching Mathematics for Engineering Students,* Miskolc (1999), pp. 15–21.

6. (with E. Molnár): Computer-aided Representation of Triangle-tilings in $\mathbf{S}^2$, $\mathbf{E}^2$ and $\mathbf{H}^2$, *Proceedings of the 3rd International Conference on Applied Informatics* Vol. **1**, (1997), pp. 223–235.

7. (with E. Molnár): How to Design Nice Tilings? *KoG, Scientific and Professional Information Journal of Croatian Society for Constructive Geometry and Computer Graphics* **3** (1998), pp. 21–28.

8. (with E. Molnár): Graphische Realisierung der homogenen Dreieckpflasterungen in S^2, E^2 und H^2, *Tagungsband der Geometrie-Tagung "107 Jahre Drehfluchtprinzip" Vorau 1997*, (1999), pp. 11–20.

9. (with E. Molnár): On classification of tilings in the planes of constant curvature by D-symbols, *Proceedings of the 4th International Conference on Applied Informatics,* (2000), pp. 117-128.

10. Klasszifiációs problémák síkban és térben, *PhD értekezés,* BME, Budapest 2001.

Brigitta Szilágyi, assistant (2002–)

1. (with S. Bácsó and Á. Orosz): On the rectifiability condition of a second order ordinary differential equation. *Acta Matematica Academicae Paedagogicae Nyíregyháziensis,* **17**, No. 2 (2001) pp. 127–129.

2. (with S. Bácsó): On a weakly Berwald Finsler space of Kropina type, *Mathematica Pannonica,* **13** No. 1 (2002), pp. 91–95.