Dr. Gusztáv Fekete

Associate Professor

Eötvös Loránd University, Faculty of Informatics,
Savaria Institute of Technology
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ACADEMIC EDUCATION

2013/10 **Ph.D. in Engineering Sciences: Agro-mechanical Engineering**
Title of dissertation: *Kinetics and kinematics of the human knee joint under standard and non-standard squat movement*
Szent István University, PhD School of Mechanical Engineering, Gödöllő, Hungary

2013/05 **Ph.D. in Engineering Sciences: Electro-mechanical Engineering**
Title of dissertation: *Kinetics and kinematics of the human knee joint under standard and non-standard squat movement*
Ghent University, Faculty of Engineering and Architecture, Ghent, Belgium

2007/06 **M.Sc. in Mechanical Engineering: Specialization in Product and Technology Development**
Title of master thesis: *Reconstructional design of a knee test rig*
Szent István University, Faculty of Mechanical Engineering, Gödöllő, Hungary

PROFESSIONAL CAREER

2017 - **Associate Professor**
Eötvös Loránd University, Faculty of Informatics, Savaria Institute of Technology

2016 – **Visiting Professor, PhD supervisor**
Ningbo University, Faculty of Sport Science:
Human Movement Research Laboratory

2016 – **Academic staff member**
Doctoral School of Chemical Engineering and Material Science, Pannon University

2015 – **Academic staff member, PhD supervisor**
Kitaibel Pál Doctoral School of Environmental Science, University of West Hungary

2014 – 2017 **Associate Professor, Head of department**
University of West Hungary, Faculty of Natural and Technical Sciences:
Savaria Institute of Technology, Department of Mechanical Engineering

2010 – 2013 **Ph.D scholar, researcher**
Ghent University, Faculty of Engineering and Architecture:
Soete Laboratory, Department of Mechanical Construction and Production

2007 – 2010 **Ph.D scholar, researcher**
Szent István University, Faculty of Mechanical Engineering:
Institute of Mechanics and Machinery, Department of Mechanics and Engineering Design

2005 – 2007 **Demonstrator**
Szent István University, Faculty of Mechanical Engineering:
Institute of Mechanics and Machinery, Department of Mechanics and Engineering Design

RESEARCH FIELDS

- **Application of Multi-body dynamics in biomechanics**: Dynamical analysis of systems with multiple degrees of freedom with the use of MSC.ADAMS. The method is extended to biomechanical systems, especially on the kinetics (forces between the tibio-femoral and patello-femoral contact surfaces) and kinematics (roll-slide between the contact surfaces) of the human knee joint.
- **Reconstructional design/development of knee prostheses:** The process of laser scanning an actual prosthesis, through the analysis of the raw-data, up to the creation of the import-ready geometrical model, which can be developed and modified by the use of several CAD systems. The modified prosthesis models can be directly imported into the MSC.ADAMS for kinematic/kinetic simulation and virtual testing.
- **Computational Fluid Dynamics (CFD):** Numerical analysis of airfoil models.

EDUCATION ACTIVITIES

As lecturer:

- Subject (BSc): Statics (NymE)
- Subject (BSc): Strength of Materials (NymE)
- Subject (BSc): Process control (NymE)
- Subject (BSc): Multibody dynamics (NymE)

As instructor:

- Subject (BSc): Statics, Mechanics of Materials, Dynamics, Vibration, Process control, Multibody dynamics (NymE)
- Subject (MSc): Elasticity, Vibration, Plates and Shells, Computational Fluid Dynamics (SZIE and UGent)

LANGUAGE SKILLS

- English: Full professional proficiency (C1)
- Dutch: Professional working proficiency (B2)
- German: Elementary proficiency (A2)
- French: Elementary proficiency (A1)
- Hungarian: Native (C2)

SOFTWARE SKILLS

- Multi-body dynamics: MSC.ADAMS
- CAD software: Solid Edge, Solid Works, AutoCad, Catia
- Finite Element software: Ansys
- Others: David 3D, Office

SCIENTIFIC ACTIVITIES AND MEMBERSHIPS

Scientific reviewer

- Clinical Biomechanics
- Experimental Techniques
- Advances in Mechanical Engineering
- Acta Physiologica Hungarica
- Medical Engineering & Physics

Guest editor

- Journal of Medical Imaging and Health Informatics: Special Issue on *"Informatics of Motor system and Exercise Science in Grand Health Research".*

Ph.D supervisor

- Fenila Christopher (Jacob). Proposed PhD title: *Targeting histamine receptors in treating allergies caused by environment.* Expected defense: 2017.
- Yan Zhang. Proposed PhD title: *Biomechanics of the lower limbs during gait*. Expected defense: 2019.
- Gongju Liu. Proposed PhD title: *Biomechanics of the knee during powerlifting*. Expected defense: 2021.

Member in scientific committees

- XVI. Technical Student Conference of Transylvania: Chair (*mechanical engineering section*)
- XVII. Technical Student Conference of Transylvania: Jury member (*mechanical engineering section*)
- Hungarian Academy of Sciences (MTA): General assembly member. Section of Engineering Sciences, Committee on Theoretical and Applied Mechanics

SCIENTIFIC ACHIEVEMENTS

2007	**1st place** Zilele Tehnice Studentesti Timisoara – Technical Days of Timisoara Politehnica University of Timisoara, Timisoara, Romania
2007	**3rd place** XXVIII. National Scientific Conference for Students: Technical Sciences Section – Applied Mechanics and Engineering Structures Széchényi István University, Győr, Hungary
2005	**2nd place** Scientific Conference for Students Szent István University, Gödöllő, Hungary
2005	**Special Award** Council of University Students Szent István University, Gödöllő, Hungary
2004	**Special Award from the „Modern Technologies Foundation"** Scientific Conference for Students Szent István University, Gödöllő, Hungary

PUBLICATIONS

Book, book chapter, monograph:

1. **G. Fekete**: Fundamental questions on the patello- and tibiofemoral knee joint: Modelling methods related to patello- and tibiofemoral kinetics and sliding-rolling ratio under squat movement. Scholar's Press – OmniScriptum GmbH & Co. KG, Heinrich-Böcking Str. 6-8, D-66121 Saarbrücken, Germany. ISBN: 978-3-639-51950-1, pp. 1-254, 2013.
2. S. Gábor, S. Ákos, **G. Fekete**: Solved problems in Statics. Edited by: Béla M. Csizmadia. Szent István University Press, Gödöllő, Hungary. pp. 1-92, 2016.

Peer reviewed journal papers with impact factor:

1. P. D. Neis, N. F. Ferreira, **G. Fekete**, L. T. Matozo, D. Masotti: Towards better understanding of the structures existing on the surface of break pads. *Tribology International*, 105, pp. 135-147, 2017. IF (2015): 2.259
2. Y. Shu, Y. Zhang, L. Fu, J. S. Baker, **G. Fekete**, J. Li, Y. Gu: Dynamic loading and kinematic analysis of vertical jump based on different forefoot morphology. *Springer Plus*, 5 (1999), pp. 1-9, 2016. IF (2016): 0.982
3. I. Bíró, B. M. Csizmadia, **G. Fekete**: Numerical sensitivity analysis on anatomical landmarks with regard to the human knee joint. *Acta Polytechnica Hungarica*, 13 (5), pp. 7-26, 2016. IF (2015): 0.544
4. X. Chen, N-A. Noda, M. A. Wahab, Y-I. Akaishi, Y. Sano, Y. Takase, **G. Fekete**: Fatigue failure analysis in bolt-nut connection having slight pitch difference using experiments and Finite Element Method. *Acta Polytechnica Hungarica*, 12 (8), pp. 61-79, 2015. IF (2015): 0.544

5. I. Bíró, **G. Fekete**: Approximate method for determining axis of finite rotation of human knee joint. *Acta Polytechnica Hungarica*, 11 (9), pp. 61-74, 2014. IF (2014): 0.649

6. **G. Fekete**, B. M. Csizmadia, M. A. Wahab, P. De Baets, L. V. Vanegas-Useche, I. Bíró: Patellofemoral model of the knee joint under non-standard squatting. *Dyna Colombia*, 81 (183), pp. 60-67, 2014. IF (2013): 0.217
7. **G. Fekete**, B. M. Csizmadia, M. A. Wahab, P. De Baets: Experimental determination of horizontal motion of human center of gravity during squatting. *Experimental Techniques*, 37 (6), pp. 66-76, 2013. IF (2013): 0.583
8. **G. Fekete**, B. M. Csizmadia, M. A. Wahab, P. De Baets, G. Katona, L. V. Vanegas-Useche, J. A. Solanilla: Sliding-rolling ratio during deep squat with regard to different knee prostheses. *Acta Polytechnica Hungarica*, 9 (5), pp. 5-24, 2012. IF (2012): 0.588

Peer reviewed journal papers:

1. Y. Shao, Y. Zhou, Y. Zhang, Y. Gu, **G. Fekete**, J. Fernandez: Surface EMG based muscle fatigue evaluation on neck-shoulder muscles while using single-monitor arm. *Journal of Biomimetics, Biomaterials and Biomedical Engineering*, 29, pp. 61-67, 2016.
2. D. Sun, Y. Gu, **G. Fekete**, J. Fernandez: Effects of different soccer boots on biomechanical charachteritics of cutting movement on artificial turf. *Journal of Biomimetics, Biomaterials and Biomedical Engineering*, 27, pp. 24-35, 2016.
3. **G. Fekete**, B. M. Csizmadia, P. De Baets, M. A. Wahab: Review of current knee biomechanical modelling techniques. *Mechanical Engineering Letters*, 5, pp. 30-36, 2011.
4. **G. Fekete**, B. M. Csizmadia: Biomechanics of the human knee joint. *Mechanical Engineering Letters*, 1, pp. 146-158, 2008.
5. **G. Fekete**, B. M. Csizmadia: Csúszva gördülés értelmezése a térdízület biomechanikai vizsgálatához. *Gép*, 12 (59), pp. 4-8, 2008.
6. **G. Fekete**, B. M. Csizmadia: Interpretation of sliding-roll phenomena in the examination of knee biomechanics. *Bulletin of Szent István University*, pp. 339-347, 2008.

7. **G. Fekete**, B. M. Csizmadia: Computational human knee joint model for determining sliding-rolling properties. *Scientific Bulletin of Politehnica University Timisoara – Transaction on Mechanics*, 53 (67), Special Issue 1, pp. 305-309, 2008.

Conference proceedings:

1. **Fekete Gusztáv**, Kollár László E., Horváth Béla: Mechanikaoktatás a duális gépészmérnökképzésben. *XII. Magyar Mechanikai Konferencia*, pp. 26, Miskolc, Magyarország, 2015.08.25-27
2. **Fekete Gusztáv**, M. Csizmadia Béla: Csúszva-gördülés az emberi térdízületben többtest-dinamikai modell vizsgálatával. *XII. Magyar Mechanikai Konferencia*, pp. 25, Miskolc, Magyarország, 2015.08.25-27.
3. G. Katona, **G. Fekete**, B. M. Csizmadia: Empirical description of knee rotation segments. *31st Danubia-Adria Symposium on Advances in Experimental Mechanics*. Kempten, Germany, 24th-27th September, 2014. Ref. number: 1034.
4. **G. Fekete**, B. M. Csizmadia, P. De Baets, M. A. Wahab: Multibody dynamic models in biomechanics: Modelling issues and a new model. *Sustainable Construction and Design*, 3 (2), pp. 128-137, 2012.
5. **G. Fekete**, B. M. Csizmadia, M. A. Wahab, P. De Baets: Analytical patellofemoral knee models: Past and Present. *Synergy in the technical development of agriculture and food industry*, pp. 1-6, Gödöllő, Hungary, October 9-16, 2011.
6. **G. Fekete**, B. Csizmadia, M. A. Wahab, P. De Baets: Analytical and computational estimation of patellofemoral forces in the knee under squatting and isometric motion. *Sustainable Construction and Design*, 2 (2), pp. 246-257, 2011.
7. **G. Fekete**, B. Csizmadia: Biomechanical research of Szent István University. *Sustainable Construction and Design*, 1 (1), pp. 107-114, 2010.
8. **G. Fekete**, B. Csizmadia: Numerical methods for determining local motions of human knee joint. *Zilele Technice Studentesti*, 12, pp. 204-210, Temesvár, Románia, Május 11-18, 2008.
9. **G. Fekete**, B. Csizmadia: Experimental methods for determining of mechanical model of human knee. *Zilele Technice Studentesti*, 12, pp. xxx-xxx, Temesvár, Románia, Május 11-18, 2007.
10. **G. Fekete**, L. Kátai: MSC.ADAMS programrendszer felhasználása a biomechanikai modellezésben. *Fiatal Műszakiak Tudományos Ülésszaka*, 13, pp. 1-4, Kolozsvár, Románia, Március 13-14, 2008.