

# Dr. Gusztáv Fekete

Associate Professor

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## ACADEMIC EDUCATION

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- 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

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- 2018 –**      **Academic staff member**  
Doctoral School of Informatics, Eötvös Loránd University
- 2017 –**      **Associate Professor**  
Eötvös Loránd University, Faculty of Informatics: Savaria Institute of Technology
- 2016 –**      **Visiting Professor, PhD supervisor**  
Ningbo University, Faculty of Sport Science: Research Academy of Grand Health
- 2016 –**      **Academic staff member, PhD supervisor**  
Doctoral School of Chemical Engineering and Material Science, Pannon University
- 2015 – 2017**      **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

## **RESEARCH FIELDS**

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- **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**

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### **As lecturer:**

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

### **As instructor:**

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

## **LANGUAGE SKILLS**

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- English: Full professional proficiency (C1)
- Dutch: Professional working proficiency (B2)
- German: Elementary proficiency (B1)
- French: Elementary proficiency (A1)
- Hungarian: Native (C2)

## **SOFTWARE SKILLS**

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- 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**

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### **Ph.D supervisor**

#### **Graduated PhDs:**

- Fenila Christopher. PhD title: *Targeting histamine H4 receptors in treating allergies caused by environment*. Kitaibel Pál Doctoral School of Environmental Sciences, Sopron University. Summa cum laude. Defence: 2017.06.07. Diploma number: 415

#### **PhD candidates in progress:**

- Sun Dong. PhD title: *Biomechanical analysis of different natural turf conditions effects on lower limbs during running and cutting movements*. Expected defense: 2021.
- Gongju Liu. Proposed PhD title: *Biomechanics of the knee during powerlifting*. Expected defense: 2021. Chemical Engineering and Material Sciences Doctoral School, Pannon University. Individual doctorate.
- Zhiyi Zheng. Proposed PhD title: *Biomechanical study on sports equipment and performance*. Chemical Engineering and Material Sciences Doctoral School, Pannon University. Individual doctorate.

### **Editorial activity**

- *Guest editor*: Journal of Medical Imaging and Health Informatics: Special Issue on “*Informatics of Motor system and Exercise Science in Grand Health Research*”.
- *Editor*: Physical Activity and Health. E-ISSN: 2515-2270. Published by Ubiquity Press.

### **Stipends and their results**

- 2017: Université libre de Bruxelles, Bio, Electro and Mechanical System, Brussels, Belgium: visiting professor position (*Fonds de la Recherche Scientifique* ([www.fnrs.be](http://www.fnrs.be))), research activity in biomechanics.
- 2017: Ningbo University, Research Academy of Grand Health, Ningbo, China: Official visiting professor of the Research Academy from 2017. Starting a bilateral research project in foot mechanics, and classes in biomechanics at the Academy. One graduated master student from Ningbo University (SUN Dong) starts his PhD work at the ELTE Campus of Szombathely via inter-state scholarship. First publications. Preparation and discussion of Chinese students starting mechanical Engineering BSc course at the Savaria Institute of Technology, ELTE.
- 2016: Ningbo University, Ningbo, China: Guest lecturer, classes for Chinese students about biomechanical modeling, preparation and discussion of the future scientific work of Chinese PhD students in Hungary.
- 2010-2013: Universiteit Gent, Ghent, Belgium: Preparation for doctoral dissertation and its successful defense.

### **Scientific reviewer**

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

### Member in scientific committees

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

### ACADEMIC AWARDS

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- 2017**      **New National Excellence Program (Új Nemzeti Kiválóság Program)**  
Wear modeling in the tibiofemoral connection  
5 months, Ministry of Human Resources, Budapest, Magyarország
- 2007**      **1<sup>st</sup> place**  
Zilele Tehnice Studentesti Timisoara – Technical Days of Timisoara  
Politehnica University of Timisoara, Timisoara, Romania
- 2007**      **3<sup>rd</sup> place**  
XXVIII. National Scientific Student Conference:  
Section of Technical Sciences – Applied mechanics and Engineering Structures  
Széchenyi István University, Győr, Hungary
- 2005**      **2<sup>nd</sup> place**  
National Scientific Student Conference  
Szent István University, Gödöllő, University
- 2005**      **Special award**  
Government of Student Council  
Szent István Egyetem, Gödöllő, Magyarország
- 2004**      **Special award from “Foundation of New Technologies”**  
National Scientific Student Conference  
Szent István University, Gödöllő, University

## **PUBLICATIONS**

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### **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.
3. M. Jawaid, R. Nagarajan, J. Sukumaran, P. De Baets: Synthesis and tribological applications of hybrid materials. Chapter 8. **G. Fekete,** M. Andó: Comparative wear model on hybrid natural fiber composites as substitutions for UHMWPE made knee implants. Wiley-VCH, In Press, 2018.

### **Peer reviewed journal papers with impact factor:**

1. D. Sun, **G. Fekete,** Q. Mei, Y. Gu: Gait abnormality and asymmetry analysis after 18-24 months of surgical repair of unilateral Achilles tendon rupture. *Journal of Medical Imaging and Health Informatics*, In Press, 2018. IF (2016): 0.624
2. T. Singh, A. Patnaik, **G. Fekete,** R. Chauhan, B. Gangil: Application of hybrid analytical hierarchy process and complex proportional assessment approach for optimal design of brake friction materials. *Polymer Composites*, In press, 2018. IF (2016): 2.324
3. M. Wang, Y. Zhang, **G. Fekete,** J. S. Baker, Y. Gu: The kinematics of the spine and the lower limbs on sagittal plane in high-heeled gait. *Journal of Medical Imaging and Health Informatics*, In Press, 2018. IF (2016): 0.624
4. Y. Zhang, M. Wang, J. Awrejcewicz, **G. Fekete,** F. Ren, Y. Gu: Using gold-standard gait analysis methods to assess experience effects on lower-limb mechanics during moderate high-heeled jogging and running. *Journal of Visual Experiments*, JoVE 55717, 2017. IF (2016): 1.1
5. P. D. Neis, N. F. Ferreira, **G. Fekete,** L. T. Matozo, D. Masotti: Towards better understanding of the structures existing on the surface of brake pads. *Tribology International*, 105, pp. 135-147, 2017. IF (2016): 2.9
6. 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
7. 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 (2016): 0.745
8. 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
9. 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
10. **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
11. **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. D. Sun, **G. Fekete**, Y. Gu, L. Jian-She: Biomechanical analysis of soccer players on different turf conditions with different studded soccer shoes. *China Sport Science and Technology*, 54 (1), pp. 37-47, 2018.
2. M. Wang, Y. Song, **G. Fekete**, Y. Gu: The Variation of Plantar Temperature and Plantar Pressure during Shod Running with Socks or not. *Journal of Biomimetics, Biomaterials and Biomedical Engineering*, 35, pp. 1-8, 2018.
3. J. Ye, D. Sun, **G. Fekete**: Ba Duan Jin preliminary analysis of the second type of plantar pressure. *Physical Activity and Health*, 2 (1), pp. 1-7, 2018.
4. Y. Zhang, **G. Fekete**, J. Fernandez, Y. Gu.: Surface Analysis of foot kinematics with unstable sole structure using oxford foot model. *Journal of Biomimetics, Biomaterials and Biomedical Engineering*, 34, pp. 1-9, 2017.
5. **G. Fekete**, D. Sun, Y. Gu, P. D. Neis, N. F. Ferreira, B. Innocenti, B. M. Csizmadia: *Comperative study on wear between tibiofemoral connection during standard and non-standard squat*. Muscle, Ligaments and Tendons Journal, Accepted, 2018.
6. **G. Fekete**, M. B. Csizmadia, I. Bíró: *Mechanikai modell a tibio-femorális kapcsolat során fellépő kopás meghatározására térd-implantátumokban*. Biomechanica Hungarica, 10 (1), pp. 55-63, 2017.
7. I. Bíró, **G. Fekete**: *Közelítő módszer két testrészt közötti véges szögelfordulás tengelyének meghatározására*. Biomechanica Hungarica, 10 (1), pp. 35-42, 2017.
8. Y. Zhang, Y. Gu, **G. Fekete**: Review on biomechanical and epidemiological research on injuries from high heels. *Journal of Ningbo University – Natural Science and Engineering Edition*, 30 (3), pp. 81-89, 2017.
9. 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.
10. D. Sun, Y. Gu, **G. Fekete**, J. Fernandez: Effects of different soccer boots on biomechanical characteristics of cutting movement on artificial turf. *Journal of Biomimetics, Biomaterials and Biomedical Engineering*, 27, pp. 24-35, 2016.
11. **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.
12. **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.
13. **G. Fekete**, B. M. Csizmadia: Biomechanics of the human knee joint. *Mechanical Engineering Letters*, 1, pp. 146-158, 2008.
14. **G. Fekete**, B. M. Csizmadia: Csúszva gördülés értelmezése a térdízület biomechanikai vizsgálatához. *Gép*, 12 (59), pp. 4-8, 2008.
15. **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.
16. **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. **Gusztáv Fekete**, Sun Dong, Gongju Liu, Yaodong Gu: Wear propagation in the knee joint during cutting movement in football. *The 4<sup>th</sup> International Science and Football Conference (ISAF 2017)*, pp. 12-13, Ningbo, China, 2017.07.19-24.
2. Sun Dong, Gongju Liu, Yaodong Gu, **Gusztáv Fekete**: Choosing the right soccer shoes with the right studs. *The 4<sup>th</sup> International Science and Football Conference (ISAF 2017)*, pp. 14-15, Ningbo, China, 2017.07.19-24.
3. Gongju Liu, **Gusztáv Fekete**, Sun Dong, Yaodong Gu: Traction behavior of soccer shoe stud designs under different game-relevant loading conditions. *The 4<sup>th</sup> International Science and Football Conference (ISAF 2017)*, pp. 66-67, Ningbo, China, 2017.07.19-24.
4. Fenila Christopher, M. Xavier Suresh, Muthulakshmi L, Indiradevi M.P, **Fekete Gusztáv**: Immunological responses caused by air pollutants – A review. *International Conference on automotive systems, agricultural equipments and manufacturing, ICAAM 2017*, pp. 66, Krishnakoil, India, 2017.03.24-25.
5. **Fekete Gusztáv**, Endre Jánosi, Dong Sun, Yaodong Gu: Interpretation of slide/roll during human knee tension and extension. *International Conference on automotive systems, agricultural equipments and manufacturing, ICAAM 2017*, pp. 67, Krishnakoil, India, 2017.03.24-25.
6. Gongju Liu, **Gusztáv Fekete**, Yaodong Gu: The kinematic analysis on barbell's horizontal displacement of Chinese elite weightlifting athletes. *Proceedings of the Sixth Asian Society of Sport Biomechanics Conference*, pp. 127, 2016.10.13-16, Ningbo, China.
7. Yan Zhang, **Gusztáv Fekete**, Yaodong Gu: Effect of different soccer stud configurations on sidestep cutting movement. *Proceedings of the Sixth Asian Society of Sport Biomechanics Conference*, pp. 121, 2016.10.13-16, Ningbo, China.
8. **Fekete Gusztáv**, Kollár László E., Horváth Béla: Mechanikaoktatás a duális gépészmérnökképzésben. *XII. Magyar Mechanikai Konferencia*, pp. 26, Miskolc, Magyarország, 2015.08.25-27
9. **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.
10. G. Katona, **G. Fekete**, B. M. Csizmadia: Empirical description of knee rotation segments. *31<sup>st</sup> Danubia-Adria Symposium on Advances in Experimental Mechanics*. Kempten, Germany, 24<sup>th</sup>-27<sup>th</sup> September, 2014. Ref. number: 1034.
11. **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.
12. **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.
13. **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.
14. **G. Fekete**, B. Csizmadia: Biomechanical research of Szent István University. *Sustainable Construction and Design*, 1 (1), pp. 107-114, 2010.
15. **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.
16. **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.