



## Antoine Falisse

Postdoctoral Scholar, Bioengineering

### Bio

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#### BIO

Dr. Falisse is a postdoctoral fellow in Bioengineering working on computational approaches to study human movement disorders. He primarily uses optimization methods, biomechanical modeling, and data from various sources (wearables, videos, medical images) to get insights into movement abnormalities and design innovative treatments and rehabilitation protocols.

Dr. Falisse received his PhD from KU Leuven (Belgium) where he worked on modeling and simulating the locomotion of children with cerebral palsy. His research was supported by the Research Foundation Flanders (FWO) through a personal fellowship. Dr. Falisse received several awards for his PhD work, including the David Winter Young Investigator Award, the Andrzej J. Komor Young Investigator Award, the VPHi Thesis Award in In Silico Medicine, and the KU Leuven Research Council Award in Biomedical Sciences.

#### INSTITUTE AFFILIATIONS

- Member, Wu Tsai Human Performance Alliance

#### HONORS AND AWARDS

- Best Doctoral Thesis Award: Runner-up, The European Society of Biomechanics (2020)
- Best VPHi Thesis in In Silico Medicine Award, The Virtual Physiological Human (VPH) Institute (2020)
- Research Council Award, KU Leuven (2020)
- Andrzej J. Komor Award, The International Society of Biomechanics: Technical Group on Computer Simulation (2019)
- David Winter Award, The International Society of Biomechanics (2019)

#### PROFESSIONAL EDUCATION

- Ph.D., KU Leuven , Biomedical Sciences (2019)
- M.S., UC Louvain , Biomedical Engineering (2014)
- B.S., UC Louvain , Engineering Science (2012)

### Research & Scholarship

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#### LAB AFFILIATIONS

- Scott Delp, Neuromuscular Biomechanics Lab (10/16/2020)

## Publications

### PUBLICATIONS

- **Predictive simulations of running gait reveal a critical dynamic role for the tail in bipedal dinosaur locomotion.** *Science advances*  
Bishop, P. J., Falisse, A., De Groot, F., Hutchinson, J. R.  
2021; 7 (39): eabi7348
- **Perspective on musculoskeletal modelling and predictive simulations of human movement to assess the neuromechanics of gait.** *Proceedings. Biological sciences*  
De Groot, F., Falisse, A.  
2021; 288 (1946): 20202432
- **Physics-Based Simulations to Predict the Differential Effects of Motor Control and Musculoskeletal Deficits on Gait Dysfunction in Cerebral Palsy: A Retrospective Case Study** *FRONTIERS IN HUMAN NEUROSCIENCE*  
Falisse, A., Pitto, L., Kainz, H., Hoang, H., Wesseling, M., Van Rossom, S., Papageorgiou, E., Bar-On, L., Hallemans, A., Desloovere, K., Molenaers, G., Van Campenhout, A., De Groot, et al  
2020; 14: 40
- **OpenSim Moco: Musculoskeletal optimal control.** *PLoS computational biology*  
Dembia, C. L., Bianco, N. A., Falisse, A. n., Hicks, J. L., Delp, S. L.  
2020; 16 (12): e1008493
- **Rapid predictive simulations with complex musculoskeletal models suggest that diverse healthy and pathological human gaits can emerge from similar control strategies** *JOURNAL OF THE ROYAL SOCIETY INTERFACE*  
Falisse, A., Serranoli, G., Dembia, C. L., Gillis, J., Jonkers, I., De Groot, F.  
2019; 16 (157): 20190402
- **Modeling toes contributes to realistic stance knee mechanics in three-dimensional predictive simulations of walking.** *PloS one*  
Falisse, A., Afschrift, M., De Groot, F.  
1800; 17 (1): e0256311
- **A Dynamic Optimization Approach for Solving Spine Kinematics While Calibrating Subject-Specific Mechanical Properties (Apr, 10.1007/s10439-021-02774-3, 2021)** *ANNALS OF BIOMEDICAL ENGINEERING*  
Wang, W., Wang, D., Falisse, A., Severijns, P., Overbergh, T., Moke, L., Scheys, L., De Groot, F., Jonkers, I.  
2021; 49 (7): 1784
- **Computational modelling of muscle fibre operating ranges in the hindlimb of a small ground bird (*Eudromia elegans*), with implications for modelling locomotion in extinct species.** *PLoS computational biology*  
Bishop, P. J., Michel, K. B., Falisse, A., Cuff, A. R., Allen, V. R., De Groot, F., Hutchinson, J. R.  
2021; 17 (4): e1008843
- **Predictive Simulations of Musculoskeletal Function and Jumping Performance in a Generalized Bird.** *Integrative organismal biology (Oxford, England)*  
Bishop, P. J., Falisse, A., De Groot, F., Hutchinson, J. R.  
2021; 3 (1): obab006
- **A Dynamic Optimization Approach for Solving Spine Kinematics While Calibrating Subject-Specific Mechanical Properties.** *Annals of biomedical engineering*  
Wang, W., Wang, D., Falisse, A., Severijns, P., Overbergh, T., Moke, L., Scheys, L., De Groot, F., Jonkers, I.  
2021
- **In Silico-Enhanced Treatment and Rehabilitation Planning for Patients with Musculoskeletal Disorders: Can Musculoskeletal Modelling and Dynamic Simulations Really Impact Current Clinical Practice?** *APPLIED SCIENCES-BASEL*  
Killen, B. A., Falisse, A., De Groot, F., Jonkers, I.  
2020; 10 (20)
- **Algorithmic differentiation improves the computational efficiency of OpenSim-based trajectory optimization of human movement** *PLOS ONE*  
Falisse, A., Serranoli, G., Dembia, C. L., Gillis, J., De Groot, F.  
2019; 14 (10): e0217730

- **Subject-Exoskeleton Contact Model Calibration Leads to Accurate Interaction Force Predictions** *IEEE TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING*  
Serrancoli, G., Falisse, A., Dembia, C., Vantilt, J., Tanghe, K., Lefeber, D., Jonkers, I., De Schutter, J., De Grootte, F.  
2019; 27 (8): 1597–1605
  
- **SimCP: A Simulation Platform to Predict Gait Performance Following Orthopedic Intervention in Children With Cerebral Palsy** *FRONTIERS IN NEUROROBOTICS*  
Pitto, L., Kainz, H., Falisse, A., Wesseling, M., Van Rossom, S., Hoang, H., Papageorgiou, E., Halleman, A., Desloovere, K., Molenaers, G., Van Campenhout, A., De Grootte, F., Jonkers, et al  
2019; 13: 54
  
- **A spasticity model based on feedback from muscle force explains muscle activity during passive stretches and gait in children with cerebral palsy** *PLOS ONE*  
Falisse, A., Bar-On, L., Desloovere, K., Jonkers, I., De Grootte, F.  
2018; 13 (12): e0208811
  
- **OpenSim Versus Human Body Model: A Comparison Study for the Lower Limbs During Gait.** *Journal of applied biomechanics*  
Falisse, A., Van Rossom, S., Gijsbers, J., Steenbrink, F., van Basten, B. J., Jonkers, I., van den Bogert, A. J., De Grootte, F.  
2018: 1-7
  
- **The influence of maximum isometric muscle force scaling on estimated muscle forces from musculoskeletal models of children with cerebral palsy.** *Gait & posture*  
Kainz, H., Goudriaan, M., Falisse, A., Huenaerts, C., Desloovere, K., De Grootte, F., Jonkers, I.  
2018; 65: 213-220
  
- **EMG-Driven Optimal Estimation of Subject-SPECIFIC Hill Model Muscle-Tendon Parameters of the Knee Joint Actuators** *IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING*  
Falisse, A., Van Rossom, S., Jonkers, I., De Grootte, F.  
2017; 64 (9): 2253–62