Postdoctoral Fellowship. February 2017

Postdoctoral Position at the LBMC (Claude Bernard University Lyon 1, Ifsttar, France): "Contribution to a highly detailed deformable musculoskeletal modelling of the shoulder joint"

A Postdoctoral Fellowship (full-time position) will be open at the Biomechanics and Impact Mechanics Laboratory (LBMC, http://www.lbmc.ifsttar.fr/), a Joint research unit of UCBL Lyon 1 and the French institute of science and technology for transport, development and networks (Ifsttar).

The position will officially start in February 2017 (or shortly after) and is funded for 6 months, as part of the ongoing research project SAMSEI (http://samsei.univ-lyon1.fr/) funded by the French ANR IDEFI Grant (National Grant for young researchers). SAMSEI involves clinicians, engineers and researchers to develop enhanced solutions for surgical training of key clinical gestures. A part of SAMSEI efforts is focus on virtual training simulators for joint puncture on the shoulder, coupling haptic feedback and numerical simulation, through three research entities with complementary experiences:

- AMPERE (http://www.ampere-lab.fr/) for the hardware part of the simulator with haptic feedback function, thanks to a PhD position,
- LIRIS (http://liris.cnrs.fr/) for numerical approaches allowing real-time simulation of deformable joints, thanks to a PhD position,
- LBMC (http://www.lbmc.ifsttar.fr/) for biomechanical modelling of anatomical structures, thanks to this post-doctoral fellowship.

The recruited person will join the "Biomechanics & Orthopaedics" team-project at LBMC in Lyon. This research project is focus on improving a deformable musculoskeletal modelling of the shoulder joint. Thus a musculoskeletal model of the shoulder with deformable muscles has been already developed in collaboration with S2M Lab (Pr Michaël BEGON, Montreal, Canada), by taking advantages of the LBMC strong experience regarding modelling of the musculoskeletal system, especially for the lower limb. This FE model of the shoulder has now to be improved with additional anatomical structures of first interest for joint puncture. The mechanical behaviour of the whole FE model will be assessed to simulate needle insertion according to dedicated experiments, as well as kinematics evaluation of anatomical structures against *in vivo* data previously acquired. This detailed FE model of the shoulder complex will be used as a reference to develop a simplified model suitable for real-time simulation. The behaviour of the resulting simplified model will be assessed against the detailed FE model. These outcomes will be successfully reached by working in close relationship with LIRIS and S2M.

Required skills and scientific knowledge.
We are seeking a highly motivated and enthusiastic Post-doc experienced in Finite Element Analysis (implicit and explicit). Candidates with experience in deformable modelling are encouraged to apply. Applicants are expected to hold a doctoral (Ph.D.) degree in mechanical engineering, biomechanical engineering, computer science, or a closely related discipline. Preferably the candidates will have a strong knowledge and experience with several of the following topics: computational biomechanics and mechanics, subject-specific modelling. This position requires excellent oral and written communication skills in French and English, as well as solid programming skills (MATLAB, SCILAB, PYTHON…).

Applications will be considered until the position is filled. The interested candidates have to apply via email to Dr. Yoann LAFON-JALBY (email: yoann.lafon@univ-lyon1.fr), in sending:

- A CV including a description of your research activities (2 pages max) with examples of first author papers,
- The report(s) from your PhD external reviewer(s), if applicable,
- a list of two references with contact information.

Keywords. Mechanics, biomechanics, shoulder joint, needle insertion, FE, deformable modelling, real-time simulation.