

## Final report

Name: Peter Varkonyi

Position: professor

Department Dept. of Mechanics, Materials, and Structures

- 1) **Detailed summary** in English and in Hungarian (duration of stay, name, position, department of host lecturer/researcher(s). If there was a lecture, its title and location.

The visit of Peter Varkonyi at Technion (Israel Institute of Technology) took place from 27/03/2022 until 31/03/2022. The host was Prof. Yizhar Or from the Faculty of Mechanical Engineering. The most important teaching activity was a seminar entitled "Plant roots and robotic arms: how to get the best out of a soft fiber?", which attracted approximately 20 attendants.. The seminar was focused around mechanical modeling of soft fibers subject to contact and loads as well as the shape control of such fibers by modulated curvatures. The lecture included biological systems and applications in robotics and structural design. The seminar was announced mainly among MSC and PhD level students. The seminar was complemented by consultation with small groups of students developing research projects in related topics.

Várkonyi Péter látogatása a Technion (Izraeli Műszaki Egyetem) intézményben 2022.03.27-től 2022.03.31-ig tartott. A vendéglátó Prof. Yizhar Or volt a Gépészmérnöki Karról. A legfontosabb oktatási tevékenység a "Növényi gyökök és robotkarok: hogyan hozzuk ki a legtöbbet egy lágy szálból?" című szeminárium volt, mintegy 20 résztvevővel. A szeminárium középpontjában az érintkezésnek és terhelésnek kitett lágy szálak mechanikai modellezése, valamint az ilyen szálak alakjának görbületszabályozás útján történő befolyásolása állt. Az előadás témája biológiai rendszerek modellezésére, valamint a robotikában és a szerkezettervezésben való alkalmazásokra terjedt ki. A szemináriumot elsősorban MSC és PhD szintű hallgatók körében hirdették meg. A szemináriumot kapcsolódó témákban kutatási projekteken dolgozó hallgatókkal való személyes konzultáció egészítette ki.

- 2) **Short summary** A short summary in English and Hungarian, which can be published on the website (and "highlights" the usefulness of Erasmus+ trips, good advertising)

Peter Varkonyi's short visit to Technion was a great opportunity to present the state of the art in the field of mechanics of soft robots and plants with senior students of the host institution. A seminar talk as well as personal consultations were organized within the time period visit.

Várkonyi Péter rövid útja az izraeli Technion egyetemre lehetőséget adott arra, hogy a fogadó intézmény végzős hallgatóival bemutassa a lágy robotok és növények mechanikájának legújabb eredményeit. A látogatás időtartama alatt szemináriumi előadásra, valamint személyes konzultációra is sor került.

- 3) **Short summary about the own study/research** (professional summary)

The teaching activity was focused around a widely studied topic of applied mechanics: modeling of soft fibers subject to contact as well as shape control of those fibers via controlled curvatures.

Contact is inevitable in many robotic applications and modeling contact involves combination of different classical physical theories. These theories are known by most senior students, however the appropriate combination in a unified framework is challenging. The teaching activity showed how this can be done through examples taken from biology and robotics.

**4) Relevance of the strategy**

Explain why the mobility project was relevant to the internationalisation strategy of the department, faculty, of personal life.

Currently, the funding system of higher education institutes in Hungary offers limited possibility for international visits. Almost all international mobility activity must be done under the umbrella of research grants received by the individual scholars. The Erasmus+ network fills this gap by offering the possibility of educational visits. The current visit was a great opportunity to the Erasmus program participant to learn about best practices, and hybrid offline-online teaching strategies used at Technion. In addition, the visit also enabled informal coordination of two courses offered by the two partner institutions in the topic of contact dynamics.

**5) Thematic focus of the partnership**

You may select a maximum of 3 subject areas that are relevant to your mobility

Contact dynamics

Mechanics of robots

Smart structures

**6) Impact and dissemination**

Explain the desired impact of the mobility on participant, beneficiaries, partner organisations (home and host) and at local, regional and national levels

The visit enabled sharing of teaching strategies, and curricula, including best practices of integrating recent research results in the curriculum. Personally the participant had the opportunity to gain important information about an excellently managed institution. This will be especially valuable because it is likely that the participants will take on a leadership role at the sending institution in the next few years. Further, as the sending institution has an increasing number of international students from the Middle East, the cultural experience gained in the Israeli environment was also valuable.

Budapest, 05/04/2023



Peter Varkonyi