Kratek opis usposabljanja mladega raziskovalca (*Short description of the Young Researcher's training)*

1. Raziskovalna organizacija (*Research organisation)*:

Univerza v Ljubljani, Fakulteta za strojništvo University of Ljubljana, Faculty of Mechanical Engineering

2. Ime, priimek in elektronski naslov mentorja (*Mentor's name, surname and email*):

Doc. dr. Franci Majdič franc.majdic@fs.uni-lj.si

3. Šifra in naziv raziskovalnega področja (*Research field*):

2.11 Konstruiranje

4. Kratek opis usposabljanja mladega raziskovalca (*Short description of the Young Researcher's training)*:

Navedite tudi morebitne druge zahteve, vezane na usposabljanje mladega raziskovalca (npr. znanje tujih jezikov, izkušnje z laboratorijskim delom, potrebne licence za usposabljanje…).

Okoljsko sprejemljive thenologije mazanja inženirskih komponent Trenje v mazanih kontaktih mešanega in hidrodinamičnega mazanja je odvisno od več parametrov, poleg mikro-vršičkov, primarno vezanih na kontaktne obremenitve in lastnosti maziva. Ključne kontaktne obremenitve so tlak in hitrost, med lastnostmi maziva pa prevladuje viskoznost, ki vpliva na strižne razmere in debelino filma. Pomemben parameter je tudi termični vpliv, ki spremeni viskoznost. V preteklosti so bili razviti različni modeli za določitev reoloških sprememb v teh kontaktih in posledično vplivi na trenje, ki vključujejo tako termične korekcije kot vplive obremenitve. O teh modelih še vedno potekajo razprave, predvsem glede vpliva tlaka in termičnega učinka. V zadnjem času pa se pojavlja še dodaten vpliv, ki ni bil pogosto obravnavan in je še vedno neraziskan, to pa je vpliv same površine in posledično obnašanja fluida na površini. Na te razmere ključno vpliva površinska energija, omočljivost in mejni filmi. Izkazalo se je, da lahko površinske prevleke vplivajo na trenje s spremembo površinske energije, a istočasno se ob tem spremenijo lahko tudi termični pogoji, kar je onemogočalo določitev prevladujočega vpliva. Drug vpliv pa predstavljajo še mejni filmi, ki prav tako spremenijo površinske lastnosti in omočljivost, a so ti rezultati še zelo redki. V zelenih tehnologijah mazanja inženirskih komponent, kot so hidravlika in lahki zobniški pogoni, ki so predmet dane raziskave, pa je potrebno iskati rešitve ne le pri klasičnih mazivih, temveč tudi pri drugih fluidih, kot je npr. voda in druge ekološko sprejemljive tekočine. V doktorski nalogi se bo kandidat osredotočil na vplive površin na trenje v kontaktih mešanega in hidrodinamičnega okoljsko sprejemljivega – zelenega - mazanja v inženirskih aplikacijah, in s tem prispeval k celovitejšemu razumevanju trenja v teh kontaktih.

Environmentally adapted lubrication for engineering components The friction in the lubricated contacts of mixed and hydrodynamic lubrication depends on several parameters, in addition to the micro-asperities, primarily related to the contact loads and the properties of the lubricant. The key contact parameters are pressure and speed, and among the properties of the lubricant, viscosity predominates, which affects the shear conditions and film thickness. An important parameter is also the thermal effect, which changes the viscosity. In the past, various models have been developed to determine the rheological changes in these

contacts and consequently the friction effects, which include both thermal corrections and load effects. These models are still under discussion. Recently, however, an additional influence has emerged that has not been frequently addressed and is still unexplored, and that is the influence of the surface itself and consequently the behavior of the fluid on the surface. Surface energy, wettability and boundary films have a key influence on this situation. It turned out that surface coatings can affect friction by changing the surface energy, but at the same time thermal conditions can also change, which made it impossible to determine the predominant influence. Another influence is represented by boundary films, which also change the surface properties and wettability, but these results are still very rare. In green technologies for lubrication of engineering components, such as hydraulics and light gear drives, which are the subject of this research, it is necessary to look for solutions not only for conventional lubricants, but also for other fluids, such as water and other ecologically acceptable liquids. In the doctoral dissertation, the candidate will focus on the effects of surfaces on friction in mixed and hydrodynamic environmentally acceptable - green - lubrication contacts in engineering applications, and thus contribute to a more comprehensive understanding of friction in these contacts.