

2. Modelling of crack propagation by tools of complex analysis (Dr. Legatiuk)

An accurate prediction of life-time behaviour of civil engineering structures requires detailed analysis of fracture mechanics problems. Particularly, considering that loads acting on a structure are typically dynamic loads, it is evident that crack modelling must reflect the action of dynamic loads. Thus, the crack propagation phenomenon should be modelled adequately. However, existing numerical methodologies used for the modelling of crack propagation are rather empirical-based, since they are not addressing clearly mathematical problems appearing during the modelling process. Therefore, in this project we would like to develop a new modelling methodology for crack propagation based on tools of complex analysis, which are proved to be very elegant and sufficient for many problems of classical linear elastic fracture mechanics. The work in the project will enforce advanced knowledge about mathematical modelling of crack propagation in an elastic medium. The work will be a combination of theoretical studies together with first steps in the implementation of the developed methodology in a computer algebra system.