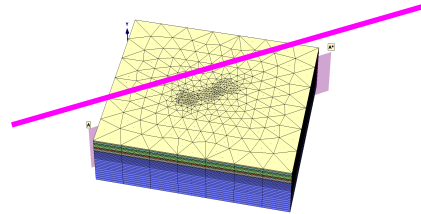


Practical Study/MSc Project: Reducing the sensitivity of a preconditioner



Assignment

Plaxis is a range of finite element packages intended for 2D and 3D analysis of deformation, stability and groundwater flow in geotechnical engineering. Plaxis currently uses a highly efficient and robust preconditioned CG-method as a solver. VORtech bv is working together with Plaxis bv on adapting the solver to make it suitable for modern processor architectures.

The efficiency of the Plaxis solver depends on various parameter settings. Among these are parameters that determine the ordering, the amount of memory that can be used and the so-called 'drop tolerance'. The performance of the solver is rather sensitive to the parameter settings. This hinders the further development of the solver. Therefore, there is a need to understand this sensitivity and, if possible, to reduce it.

The student is expected to develop a general understanding of the workings of the solver and to experiment with the various parameters in order to learn how they influence the performance. If possible, modifications can be proposed and tested to reduce the sensitivity.

The assignment can be done both as a practical study assignment and as an MSc project. When done as a practical study, the aims of the research will be limited and the approach will be more pragmatic. If the assignment is done as an MSc project, the student is expected to develop a research plan and to come to results that can be applied in practice. In this case, there will probably be sufficient time to pay particular attention to the effect of the ordering.

The student will be supervised and assisted by experienced mathematicians from VORtech and Delft University of Technology.

Location

The work will be conducted at VORtech. VORtech is a mathematical consulting firm, specialising in (numerical) simulation and large scale computations. It was founded in 1996 and now employs a regular staff of 15. VORtech combines a thorough knowledge of applied mathematics with the ability to develop reliable software in a professional way. Our customers come from very diverse application fields such as water management, traffic management, chemistry and environmental management.