

## **Extension of the Method of Difference Potentials to Problems of Elastic Plastic Mechanics**

The method of Difference Potentials (DPM) [1] proved to be a very efficient tool for tackling many problems of mathematical physics. Its main advantage is that it allows boundary value problem to be reduced to a boundary equation in quite arbitrary domains without knowledge of Green's function. This property is achieved via specially constructed difference projection operators and surface potentials. The potentials can be calculated in advance regardless the boundary conditions and forces. Therefore, the method is very efficient with respect to computational time for design problems in which multiple computations are needed for optimisation. The method is also quite universal since it can always be realised on rectangular structural grids with high accuracy regardless how complex the region is. Recently the method has been successfully applied to elastic problem with singular cracks [2]. This project is a following on work to extent DPM to nonlinear Mechanics. Although being a challenge, this problem is realistic because similar objectives were successfully achieved in fluid dynamics [1]. If successful the project will have high impact on non-linear numerical analyses. The project is supported by EDF and will be carried in close collaboration with the company.

1. Ryaben'kii, V.S., "Method of Difference Potentials and Its Applications", Springer-Verlag, 2002.
2. Woodward, W.H., Utyuzhnikov, S., Massin, P., "On the application of the method of difference potentials to linear elastic fracture mechanics", Int. J. for Numerical Methods in Engineering, 2015, 103 (10): 703-736.