# An improved complex variable element-free Galerkin (ICVEFG) method

# for elastoplasticity problems

**\*Yumin Cheng[1], Funong Bai[1], Miaojuan Peng[2] and Zan Zhang[3]**

[1]Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University, Shanghai 200072, China
[2]Department of Civil Engineering, Shanghai University, Shanghai 200072, China
[3]School of Science, East China University of Science and Technology, Shanghai 200237, China

\*Corresponding author: ymcheng@SHU.EDU.CN

In this paper, based on element-free Galerkin (EFG) method and the improved complex variable moving least-squares (ICVMLS) approximation, the improved complex variable element-free Galerkin (ICVEFG) method is presented for two-dimensional elastoplasticity problems. The functional in the ICVMLS approximation has an explicit mathematical meaning. Compared with the complex variable moving least-squares (CVMLS) approximation presented by Cheng and Ren, the ICVMLS approximation has greater computational precision and efficiency. The Galerkin weak form of two-dimensional elastoplasticity problems is employed to obtain the system equations, and the penalty method is used to apply the essential boundary conditions. Then the corresponding formulae of the ICVEFG method for two-dimensional elastoplasticity problems are obtained. Compared with the conventional EFG methods for two-dimensional elastoplasticity problems, the ICVEFG method has greater computational precision and efficiency. For the purposes of demonstration, three selected numerical examples are solved using the ICVEFG method.

**Keywords:**  meshless method, moving least-squares (MLS) approximation, improved complex variable moving least-squares (ICVMLS) approximation, element-free Galerkin (EFG) method, improved complex variable element-free Galerkin (ICVEFG) method, elastoplasticity