World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:10, No:05, 2016

Applying Element Free Galerkin Method on Beam and Plate

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Abstract : This paper develops a meshless approach, called Element Free Galerkin (EFG) method, which is based on the weak form Moving Least Squares (MLS) of the partial differential governing equations and employs the interpolation to construct the meshless shape functions. The variation weak form is used in the EFG where the trial and test functions are approximated bye the MLS approximation. Since the shape functions constructed by this discretization have the weight function property based on the randomly distributed points, the essential boundary conditions can be implemented easily. The local weak form of the partial differential governing equations is obtained by the weighted residual method within the simple local quadrature domain. The spline function with high continuity is used as the weight function. The presently developed EFG method is a truly meshless method, as it does not require the mesh, either for the construction of the shape functions, or for the integration of the local weak form. Several numerical examples of two-dimensional static structural analysis are presented to illustrate the performance of the present EFG method. They show that the EFG method is highly efficient for the implementation and highly accurate for the computation. The present method is used to analyze the static deflection of beams and plate hole

Keywords : numerical computation, element-free Galerkin (EFG), moving least squares (MLS), meshless methods
Conference Title : ICEIM 2016 : International Conference on Engineering and Innovative Materials
Conference Location : Rome, Italy
Conference Dates : May 02-03, 2016