PERFORMANCE OF 2D FRAME OPTIMIZATION CONSIDERING THE SEQUENCE OF COLUMN FAILURE MECHANISM USING GA-SAP2000

Mohammad Ghozi
Bhayangkara Surabaya University
INDONESIA
mghozi2002@gmail.com

Dr. Techn. Pujo Aji
Sepuluh Nopember Institute of Technology
INDONESIA
pujo@ce.its.ac.id

Prof. Priyo Suprobo, Ph.D
Sepuluh Nopember Institute of Technology
INDONESIA
priyo@ce.its.ac.id

ABSTRACT

Many constraints must be considered in steel structure design due to the code requirements and practical aspects like strong column weak beam, soft story, column's plastic modulus and column's position. The purpose of this paper is to discuss differences between result of optimization with strong column weak beam, column's plastic moment and column position as constraints. Optimization processes are carried out through 30 members of 2D steel structure model using genetic algorithm-SAP2000.Performance of two optimized structures are presented by conducting nonlinear static analysis. Optimized structure's data are analyzed such as structure weight, displacement, pushover curve, ductility, columns plastic modulus, column cross section area and beam to column flexural strength ratio The second objective function which considered five constraints can produce 81.25% lighter and 1.765 times more ductile than the other one. It is concluded that optimization considering the sequence of column failure mechanism is very useful and should be included in every design of steel structure.

Keywords: Optimization, Steel structure, Strong column weak beam, column plastic modulus.