INTRODUCING E2D: A COMPUTER PROGRAM FOR USING THE RESULT OF 'ETABS' IN 'DRAIN'

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ABSTRACT :

DRAIN software is one of well-known and powerful computer program for nonlinear static and dynamic analysis of structural systems.   However, because of difficulties in preparing the required input file, creation of computational errors in preparation of the input file, and difficulties in troubleshooting from the input file has not be widely used for engineering purposes.   This paper presents a specific computer program developed in MATLAB environment for overcoming the aforementioned difficulties.   The proposed software uses the output of ETABS computer program (as one the widely used programs), performs some processing on it and develops the input file for DRAIN program, and also process the output of this program and presents them graphically.   Among various capabilities of the proposed program which has been called E2D (ETABS to DRAIN) are the followings:

- Classification of the structural model's elements into groups as beam, column, brace, and if necessary subgroups as link beam, cantilever beam, K brace, X brace, and so on
- Distinction between elements characteristics and types of connection and the orientations of elements
- Diagnosis of location and type of link beams from the text information of DRAIN program
- Correction and filtering of accelerograms to be used by DRAIN program
- Automatic loading of structure based on the code formulas by using the base shear force value
- Full processing of the output files of DRAIN program and graphical presentation of time histories and envelopes of displacements and stories' shear forces
- Calculating the hysteretic, damping, kinetic and total energy for members as well as stories of the building model
- Performing iterative analyses and repetition cycles for nonlinear analyses
- Possibility of making connection with EXCEL program and presenting the results in its spread sheets
- Possibility of simulating the plastic deformations and solving the Finite Element equations for frame elements by consideration of boundary conditions of plastic hinges, along with showing the locations of plastic hinges during the time of accelerograms application to the structure in animation format
- Showing the results of analysis at any time instants which the user defines

By using the proposed E2D program it is possible to perform even more than 1000 nonlinear time history analyses per day by an ordinary personal computer.

Keywords: ETABS output file, DRAIN input file, MATLAB program, EXCEL spread sheet, nonlinear time history analysis