

Structural Analysis Using Virtual Work Method

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CE474 – Structural Analysis II The three distinct structures in the virtual systems we will consider are: a) a propped cantilever identical to the real structure (statically indeterminate to 1st degree). b) a simplified structure with moment constraint at A released. This is a simply supported beam.

CEE 421L. Matrix Structural Analysis Fall, 2012 Henri P. Gavin The Principle of Virtual Work Definitions: Virtual work is the work done by a real force acting through a virtual displacement or a virtual force acting through a real displacement. A virtual displacement is any displacement consistent with the constraints of

Procedure for Analysis- Virtual work method or unit load method The following is a step-by-step procedure to find deflection and slope at a point using the Virtual Work Method. An understanding of Beam Analysis is recommended before undertaking this type of Virtual Work problem.

Force Method for Analysis of Indeterminate Structures Structural Analysis requires that the equations governing the following physical relationships be satisfied: Primarily two types of methods of analysis: Virtual Work done by a system of forces P B while undergoing

Structural Analysis III 4 Dr. C. Caprani 1. Introduction 1.1 General Virtual Work is a fundamental theory in the mechanics of bodies. So fundamental in fact, that Newton's 3 equations of equilibrium can be derived from it.

2.2 Virtual work-Principle of virtual forces 18 3.8 Force method for arbitrary degree of static indeterminacy 64 3.9 Maxwell's law 64 3.10 Summary of force method 65 In structural analysis we usually work with one- or two-dimensional idealizations

Structural analysis can be addressed using three main approaches [9]: a) tensor formulations (Newtonian mechanics and vector), b) formulations based on the principles of virtual work, c) formulations based on classical mechanics [10]. In the design of steel structures, reinforced concrete and prestressed concrete, the study

2. Beam-Stiffness and moment carryover: to use for the analysis of statically indeterminate beams (unlikely that you get a SI frame). 3. Equations for the calculations of the deflections of trusses and beams using the virtual work method. Careful it is the virtual force/moment times the actual displacement (FL/AE for trusses, and M/EI for beams). 4.

– Determine the slope and deflection by using Unit Load Method • Expected Outcomes : – Structural Analysis, Hibbeler, 7th Edition, Prentice Hall – Structural Analysis, SI Edition by Aslam Kassimali, Cengage Learning – Structural Analysis, Coates, Coatie and Kong • The external virtual work done by the unit load is 1.

Indeterminate Analysis Force Method1 • The force (flexibility) method expresses the relationships between displacements and forces that exist in a structure. • Primary objective of the force method is to determine the chosen set of excess unknown forces and/or couples – redundants. • The number of redundants is equal to the degree of static