

**VIRTUAL SUPPORTS TO ANALYSE STATIC
FLOATING STRUCTURES AND DYNAMIC SYSTEMS
BY STATIC ANALYSIS SOFTWARE**

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Degree of Master of Science

Department of Chemical and Process Engineering

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the
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DECLARATION

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.....

Supervisor Date

Mr. Kapila Peiris

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Supervisor Date

Dr. M. Narayana

Abstract

When an object with high rigidity is subjected to free forces, moments and constrained forces, moments, stresses and strain will be formed in it. A support may be identified as a constrained which supplies forces/moment without any displacement.

In some cases although the constrains could balance the free forces/moments by and keep the system under equilibrium, the constraints cannot be keep a unique displacement (field). Therefore in such a case in an elemental analysis the solution for displacements will have many solutions conditions and in a computer where numerical methods (iterative) are used such solution will not be possible.

In this study a method is introduced to overcome this problem by the concept of ‘virtual constraints’ without changing the original stress-strain condition of the system.

System without adequate constraints will be known as floating system and dynamic systems (with high rigidity) with the application of reversed inertia forces could also be considered as floating system. Therefore such system also could be analyzed for stress-strain by proper introduction of artificial supports with the same software meant to analyses static system.

Keywords – Virtual supports, Floating system

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List of abbreviations

FEA	Finite Element Analysis
FEM	Finite Element Method
CFD	Computational Fluid Dynamics
AMS	Automatic Multi-level Sub structuring eigen solver
CAE	Complete Abaqus Environment
MPE	Minimum potential Energy theorem
CST	Constant Strain Triangular
NERD	National Engineering Research and Development Center
DBC	Displacement Boundary Condition