

Table of Contents

Finite Element Analysis (FEA)

FEA Theory and Fundamentals

ANSYS APDL (Parametric Design Language)

APDL Basics and Geometry

Elements, Materials, and Meshing

Loads, Solution, and Postprocessing

APDL Programming (Scripting)

ANSYS Mechanical (Workbench)

Advanced Analyses and Special Topics

3

3

3

3

3

3

3

4

Finite Element Analysis (FEA)

[Finite_element_method](#)

FEA Theory and Fundamentals

- [Introduction to the Finite Element Method \(FEM\)](#)
- [Stiffness Matrix and Degrees of Freedom \(DOF\)](#)
- [Shape Functions and Interpolation](#)
- [Mesh Convergence, Error Analysis, and Verification](#)

ANSYS APDL (Parametric Design Language)

APDL Basics and Geometry

- [APDL Interface \(GUI\), Command Logic, and File Structure \(.db, .rst, .mac\)](#)
- [Geometry Modeling: Keypoints, Lines, Areas, Volumes, and Boolean Operations](#)

Elements, Materials, and Meshing

- [Element Types \(BEAM, SHELL, SOLID\) and Real Constants](#)
- [Material Models \(Linear Elastic, Hyperelastic, Plasticity\)](#)
- [Meshing: Mapped/Free Mesh, Size Control, and Sweep](#)

Loads, Solution, and Postprocessing

- [Boundary Conditions \(DOF\) and Loads \(Force, Pressure, Thermal, Body Loads\)](#)
- [Solution Phase: Static, Modal, Transient, Harmonic](#)
- [Postprocessing \(POST1 / POST26\): Contour Plots and Data Extraction](#)

APDL Programming (Scripting)

- [Variables, *GET Command, Loops \(*DO\), and Macro \(.mac\) Writing](#)

ANSYS Mechanical (Workbench)

- [Workbench Interface, Engineering Data, and Geometry Links](#)
- [Linear Static Analysis Setup and Solution](#)
- [Contact Mechanics: Bonded, Frictional, No Separation](#)
- [Modal Analysis and Vibration Characteristics](#)
- [Steady-State and Transient Thermal Analyses](#)
- [Fatigue Analysis: S-N Curves and Life Calculation](#)
- [Running APDL Codes within Workbench using Command Snippets](#)

Advanced Analyses and Special Topics

- [Non-linear Analyses \(Geometric, Material, and Contact Non-linearities\)](#)
- [Explicit Dynamics: Crash, Blast, and Drop Tests \(LS-DYNA/Autodyn\)](#)
- [Topology Optimization and Weight Reduction Strategies](#)
- [Submodeling: Accurate Stress Analysis in Localized Regions](#)

The information in this document is cited from [UCH Wiki](#).

From:

<https://wiki.ulascemh.com/> - **UCH**

Permanent link:

<https://wiki.ulascemh.com/doku.php?id=en:eng:cada:fea:start&rev=1775152926>

Last update: **2026/04/02 18:02**

