

ZAERO

Training



August 14 - 18, 2017



ZONA TECHNOLOGY

9489 E. Ironwood Square Drive, Scottsdale, AZ, 85258
Tel (480) 945-9988 · Fax (480) 945-6588 · www.zonatech.com

ZAERO Basic & Advanced Training

Scottsdale, Arizona

Basic Topics: August 14 - 16, 2017

Advanced Topics: August 17 - 18, 2017

The ZAERO software system is an advanced Computer Aided Engineering (CAE) tool that integrates all essential disciplines required for aeroelastic design and analysis. The objective of training is for engineers who are interested in learning how to apply ZAERO in the areas of Static/Dynamic Loads, Flutter, & Aeroservoelasticity.

Class Topics

Basic Topics

Day One

- About ZAERO
 - ▷ Main Features of ZAERO
- Theory Behind ZAERO
 - ▷ ZONA6, ZONA7, ZTRAN, ZTAW, and ZONA7U
- Aerodynamic Modeling Guidelines
 - ▷ High Fidelity Wing and Body Modeling
- Spline
 - ▷ Beam Spline, Surface Spline, 3D Spline
- AIC Matrix Generation
 - ▷ Issues on High Reduced Frequencies

Day Two

- Static Aeroelastic Analysis
 - ▷ Theoretical Background
 - ▷ Modal Approach
 - ▷ Trim Analysis
 - ▷ Over-Determined Trim Analysis
- Flutter Analysis
 - ▷ Methods for Flutter Analysis (*K*-, *p-k*, and *g*-methods)
 - ▷ Parametric Flutter Analysis
 - ▷ Guidelines for Flutter Analysis
 - ▷ Mass Increment Method for Massive Aircraft/ Store Configurations
 - ▷ Asymmetric Store Configurations using Half Span Model

Day Three

- ZAERO Hands-On Training (**Laptop Required**)
- Trim Analysis
 - ▷ Set-Up Trim Analysis
- Flutter Analysis
 - ▷ Set-Up Flutter Analysis
- Aerodynamic Model Generator Based on CFD Surface Mesh

Advanced Topics

Day One

- State-Space ASE Modeling and Analysis
 - ▷ Theoretical Background
 - ▷ Rational Function Approximation
 - Roger's Method
 - Minimum State Method
 - ▷ State-Space Aeroelastic Modeling
 - ▷ Actuator and Sensor Modeling
 - ▷ ASE Plant Model
 - ▷ ASE Vehicle and Closed-Loop System Models
- Time Domain ASE Modeling and Stability Analysis
- Frequency Domain ASE Modeling and Stability Analysis

Day Two

- Dynamic Response to Gust
 - ▷ State-Space Formulation with Gust
 - ▷ Discrete Gust Response
 - Frequency Domain Formulation
 - Time Domain Formulation
 - Hybrid Approach
 - ▷ Continuous Gust Response
 - Frequency Domain Formulation
 - Time Domain Formulation
- Loads Recovering Methods
 - ▷ Mode-Displacement (MD) Method
 - ▷ Summation-of-Force (SOF) Method
- Nonlinear Flutter Analysis
 - ▷ Formulation of Equation
 - ▷ Issues of Modal Approach

ZAERO Basic Training

Schedule

Day 1 - Monday

9:00 am - Welcome Check-In
9:30 am - ZAERO Overview
9:50 am - ZAERO Input Data Structure
10:30 am - Break
10:40 am - Aeroelasticity in ZAERO
11:10 am - AIC Matrix Generation
12:30 pm - Lunch Break
1:30 pm - Aerodynamic Modeling Guidelines
3:30 pm - Break
3:10 pm - Aerodynamic Modeling Guidelines
(continued)
4:30 pm - Question & Answer
5:00 pm - Class Dismissed

Day 2 - Tuesday

9:00 am - Spline Module
10:30 am - Break
10:40 am - Flutter Solution Methods
11:15 am - Flutter Bulk Data Card Input
12:00 pm - Guidelines for Flutter Analysis
12:30 pm - Lunch Break
1:30 pm - Parametric Flutter Analysis
2:30 pm - Static Aeroelastic Analysis:
Theoretical Background, &
Modal Analysis
3:30 pm - Break
3:40 pm - Static Aeroelastic Analysis: Trim
Analysis, & Bulk Data Card Input
4:30 pm - Question & Answer
5:00 pm - Class Dismissed

Day 3 - Wednesday

9:00 am - ZAERO Hands-On: Aerodynamic
Modeling
10:30 am - Break
10:40 am - ZAERO Hands-On: Flutter Analysis
11:10 am - ZAERO Hands-On: TRIM Analysis
12:30 pm - Lunch Break
1:30 pm - Introduction to other ZONA Software
3:30 pm - Break
3:40 pm - Question & Answer
4:30 pm - Class Dismissed

ZAERO Advanced Training

Schedule

Day 1 - Thursday

- 9:00 am - Welcome Check-In
- 9:10 am - Theoretical Background of ASE
- 10:30 am - Break
- 11:10 am - Theoretical Background of ASE
(continued)
- 12:30 pm - Lunch Break
- 1:30 pm - Bulk Data Input for Open-Loop
ASE Analysis
- 3:30 pm - Break
- 3:40 pm - Bulk Data Input for Closed-Loop
ASE Analysis
- 4:40 pm - Question & Answer
- 5:00 pm - Class Dismissed

Day 2 - Friday

- 9:00 am - ASE Models for Gust Response
Analysis
- 10:00 am - Frequency Domain Discrete Gust
Analysis
- 11:00 am - Break
- 11:10 am - State-Space and Hybrid State-Space
Discrete Gust Analysis
- 12:30 pm - Lunch Break
- 1:30 pm - Frequency & Time-Domain Continuous
Gust Analysis
- 2:30 pm - Loads Recovering Methods
- 3:30 pm - Break
- 3:40 pm - Nonlinear Flutter Analysis
- 4:40 pm - Question & Answer
- 5:00 pm - Class Dismissed