

FEMRDYN

Capability Summary

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***FEMRDYN* Features**

- ❖ **Platform independent GUI (100% Java)**
- ❖ **6 DOF conical beam finite element shafting**
- ❖ **Linear and nonlinear traditional supports**
- ❖ **Comprehensive magnetic bearing models**
- ❖ **Natural frequency and forced response**
- ❖ **Integrated graphical displays**

Platform Independent Java GUI

FEMRDYN: Dual Shaft Test Case - Modes.dyn

File Define Report Analyze Plot Window Help

Geometry Segment Definition

Shaft	Type	Position	Length	OR Left	IR Left	OR Right	IR Right	Material Property	
5	2	Both	10.0	2.0	1.8	1.5	1.8	1.5	Al 6061
6	2	Stiff	12.0	4.0	2.0	1.5	2.0	1.5	Al 6061
7	2	Mass	12.0	4.0	2.0	1.5	2.0	1.5	Ti 6-4

Shaft Properties Definition

Shaft Number	Label	Spin Ratio	Color
1		1.0	Blue
2		1.5	Pink

Segment Geometry Plot

Whirl Map

Calculated Natural Frequencies

Analysis Speed = 7500.0 rpm

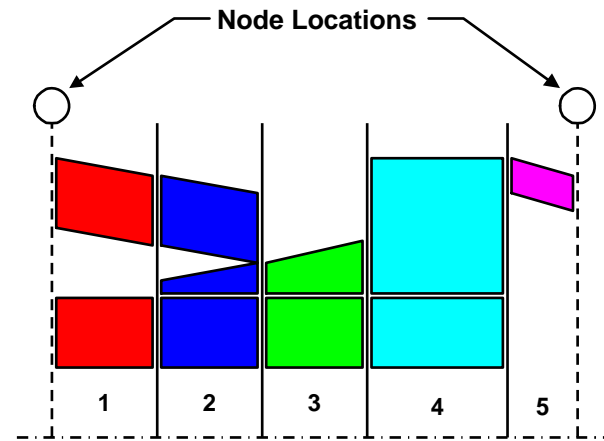
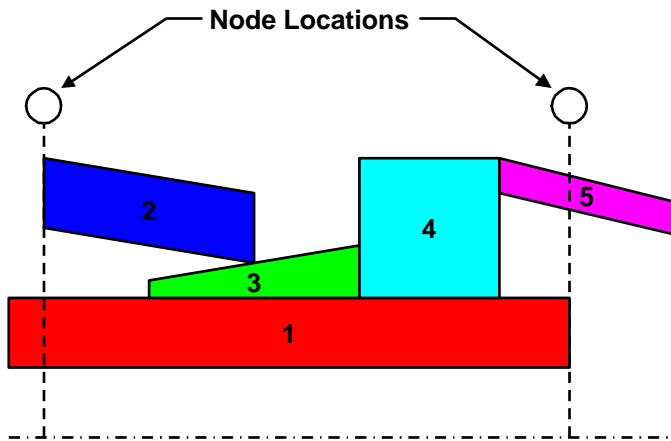
Mode Number	(rpm)	Damped Natural Frequencies (Hz)	(rad/sec)	Log Decrement
1	7732.72	128.879	809.769	0.161252
2	9636.47	160.608	1009.13	0.261212
3	14914.9	248.581	1561.88	0.791536
4	16054.4	267.574	1681.22	0.83714
5	20982.2	349.703	2197.25	1.39893
6	22711.3	378.521	2378.32	1.53114

Analysis Speed = 10000.0 rpm

Status: Display natural frequency whirl map requested

Advanced Finite Element Model

❖ Conical beam elements

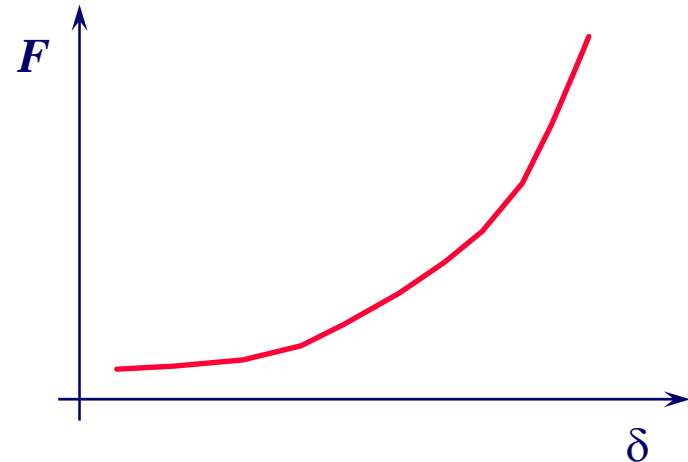


❖ Automatic segment discretization

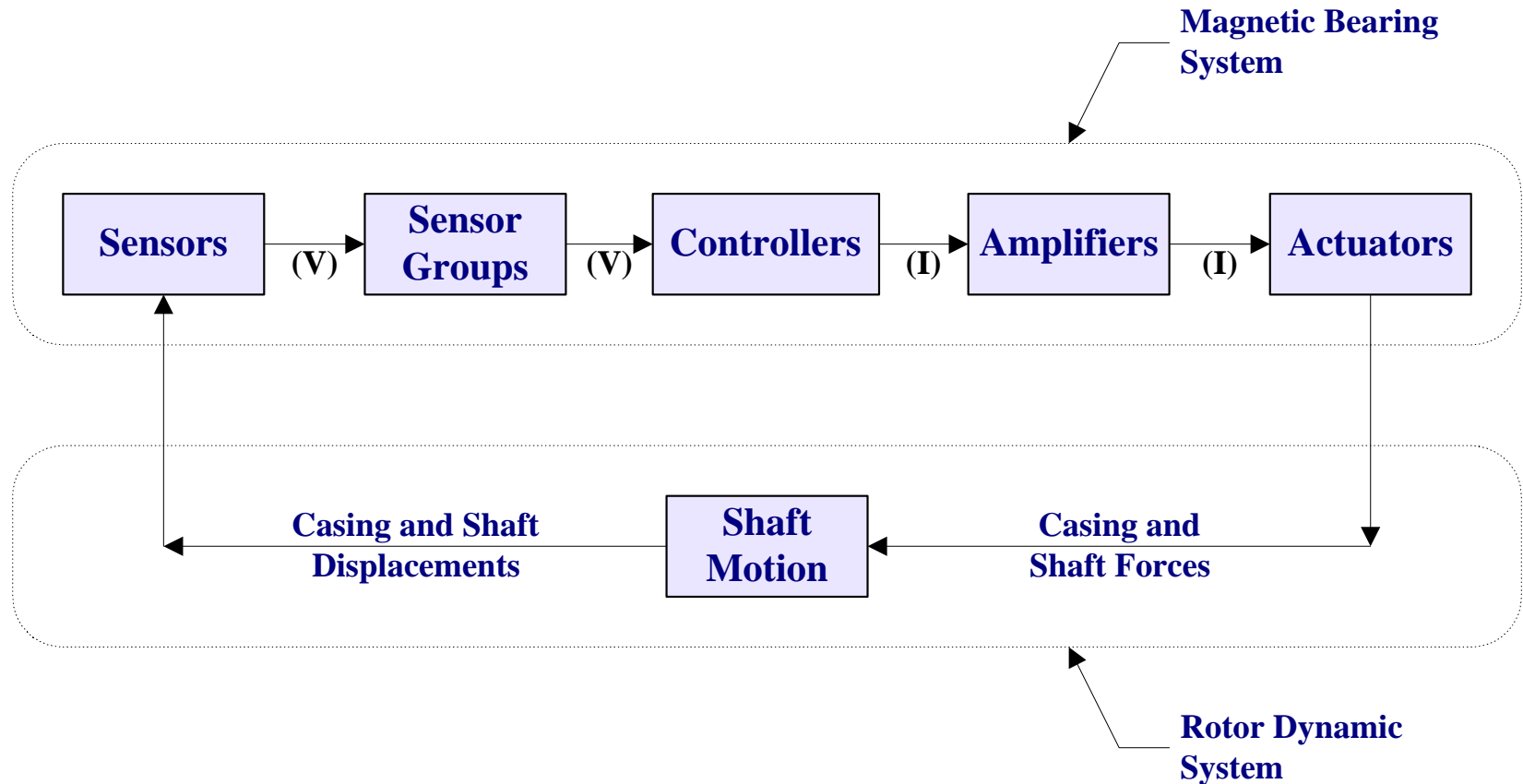
❖ Unlimited problem size

Linear and Nonlinear Supports

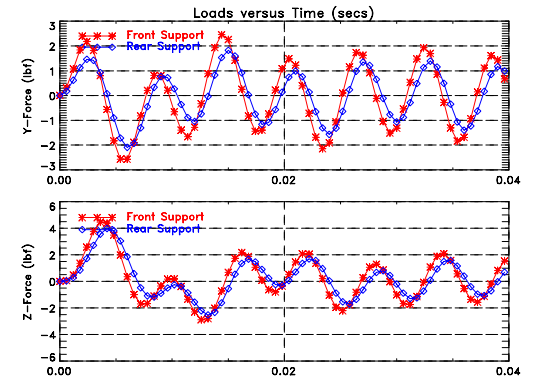
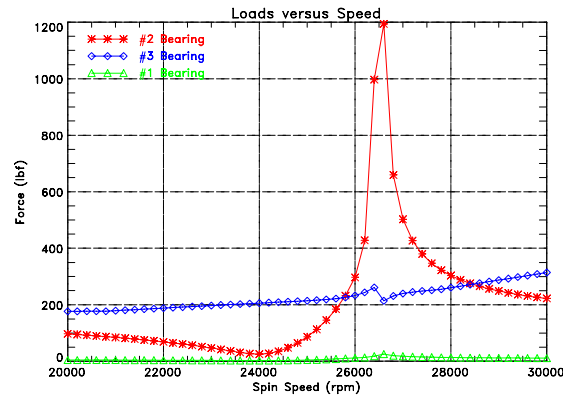
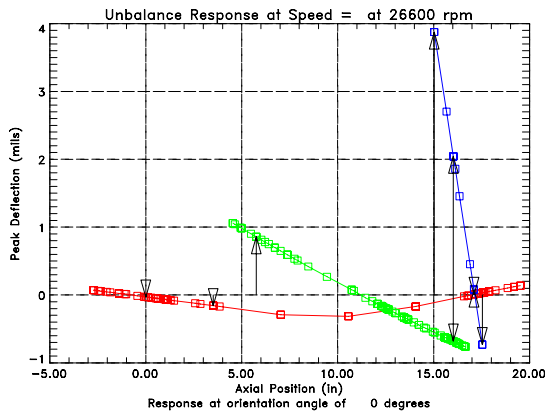
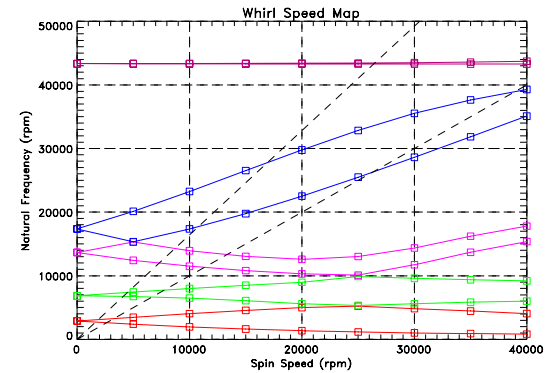
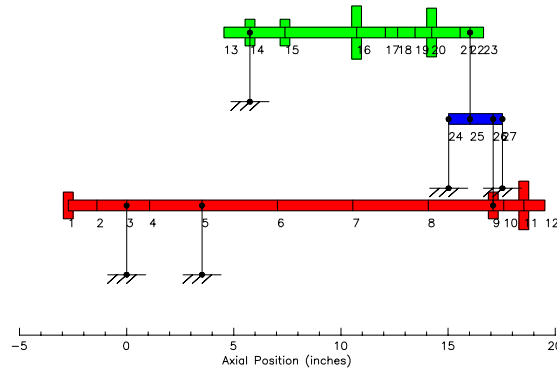
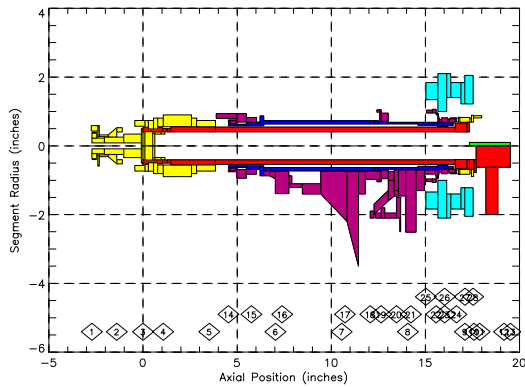
- ❖ Standard speed dependent linear coefficients
- ❖ Force-displacement
 - Tip rubs
 - Deadband
 - Auxiliary bearings
- ❖ Squeeze films (long and short)



Complete Magnetic Bearing System Analysis



Full Set of Graphical Displays



Comprehensive Analysis Options

- ❖ **Lateral, Torsional, and Axial analyses**
- ❖ **Damped natural frequencies**
 - Whirl and Stability maps
 - Mode shapes
- ❖ **Steady and Transient forced response**
 - Unbalance, frequency, maneuver, and time loads
 - Displacements, support loads, and response shapes

Very General Nodal Forces

- ❖ **Radial, Angular, Torsional, and Axial forces**
- ❖ **Loads are frequency and time dependent**
 - Constant, frequency based, and phased forces
 - Loads can be started and stopped at various times
- ❖ **Forces are combined with other loads**
 - Nodal loads summed with unbalance
 - Loads are frequency independent (asynchronous)

Advanced, Validated Design Tool

- ❖ **6 DOF conical beam finite elements with automatic discretization**
- ❖ **Complete set of support options**
- ❖ **Speed and time based analysis**
- ❖ **Comprehensive display and reporting**
- ❖ **Analytical predictions validated from Air Force and NASA rig testing**