TPF Science, Technology, and Design Expo '03

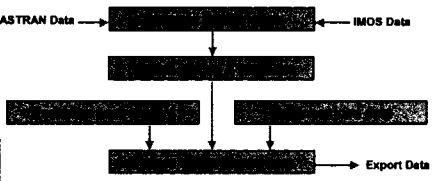
Dynamic Models of TPF Cryo Structures

Integrated System Dynamics (ISYSD)

General Specification

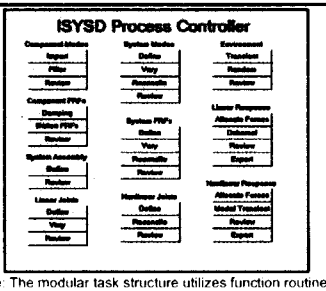
- MATLAB-based dynamics toolbox
- Import NASTRAN, IMOS (CMS) structural components
- Assemble (CMS) system dynamic model
- Compute broad-band system modes + residuals
- Include non-linear joint mechanics
- Evaluate sensitivity to parametric uncertainties
- Reconcile predicted & measured dynamics
- Simulate nonlinear system response
- Export system models for general applications

Basic Dynamic Analysis Process Flow



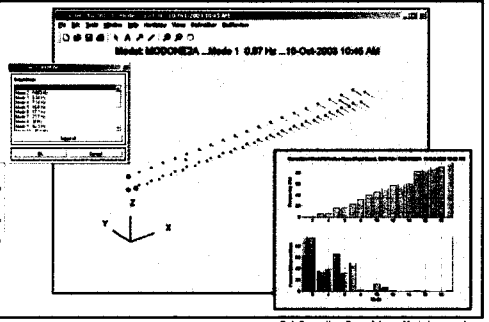
Note: Toolbox features include extensive graphical data review, parametric sensitivity analysis, test/analysis reconciliation

Front Panel Push-Button GUI

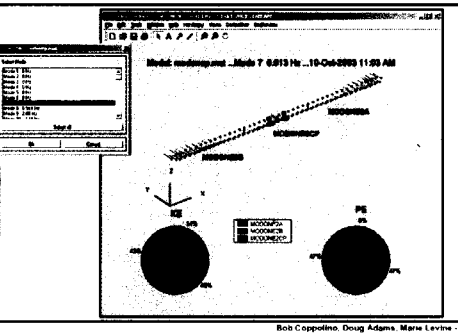


Note: The modular task structure utilizes function routines, which may be used to define custom processing tasks.

Component Modes Function Group

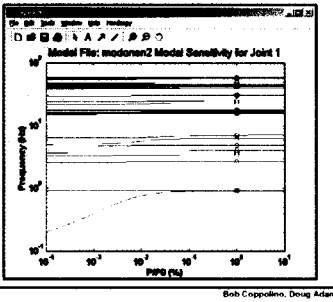


System Modes Function Group



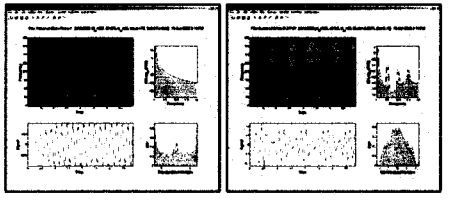
System Modes Function Group

Modal Sensitivity to Joint Stiffness Variation



Nonlinear Response Function Group

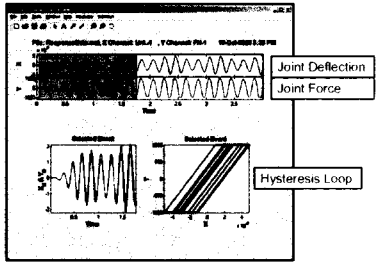
Applied 5 Hz Force in Y Direction | Joint Friction Response (Force)



Note: Time history data panels consist of spectrogram (upper left), time history (lower left), power spectrum (upper right), probability density (lower right)

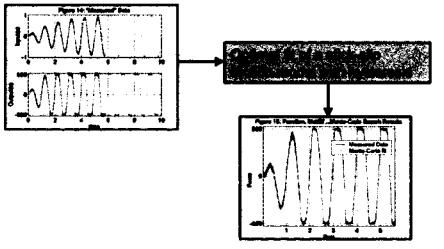
Nonlinear Response Function Group

Export of Response Data & Post-Processing in ITAP



Nonlinear Joints Function Group

Reconciliation of Joint Test and Analysis Data



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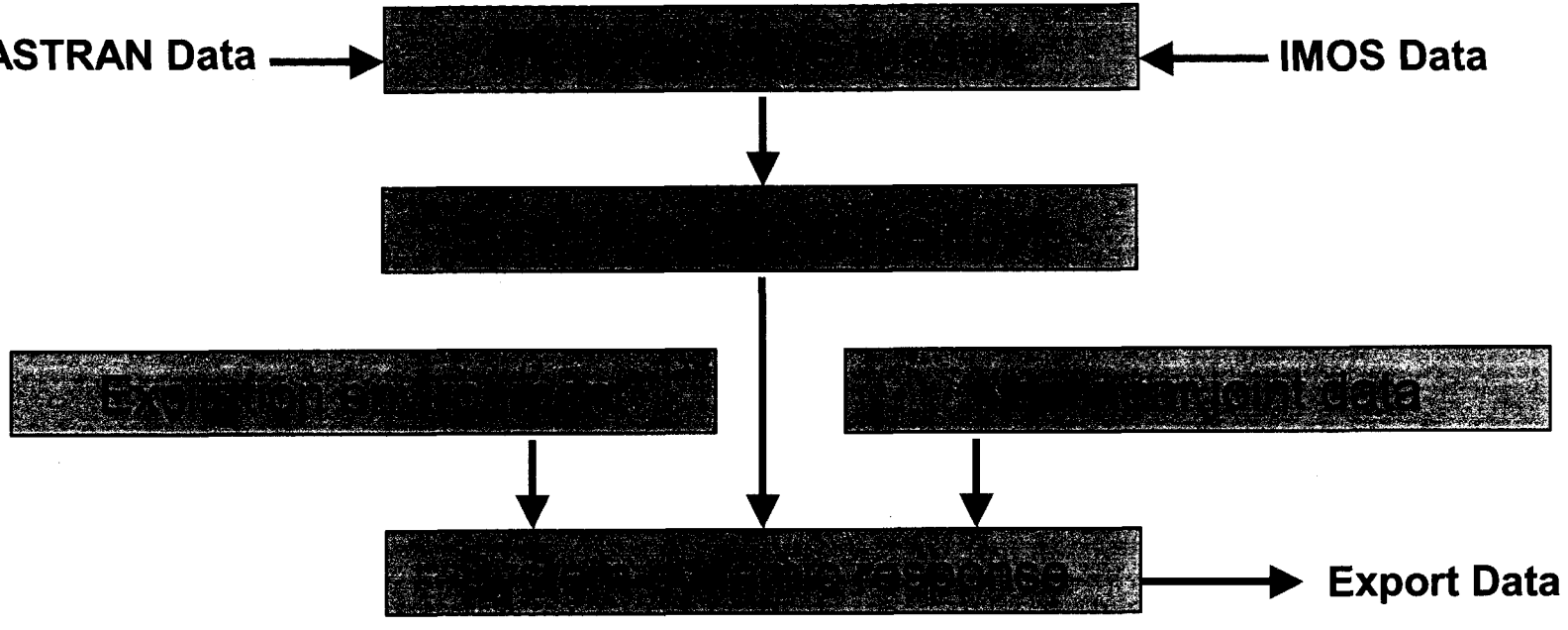

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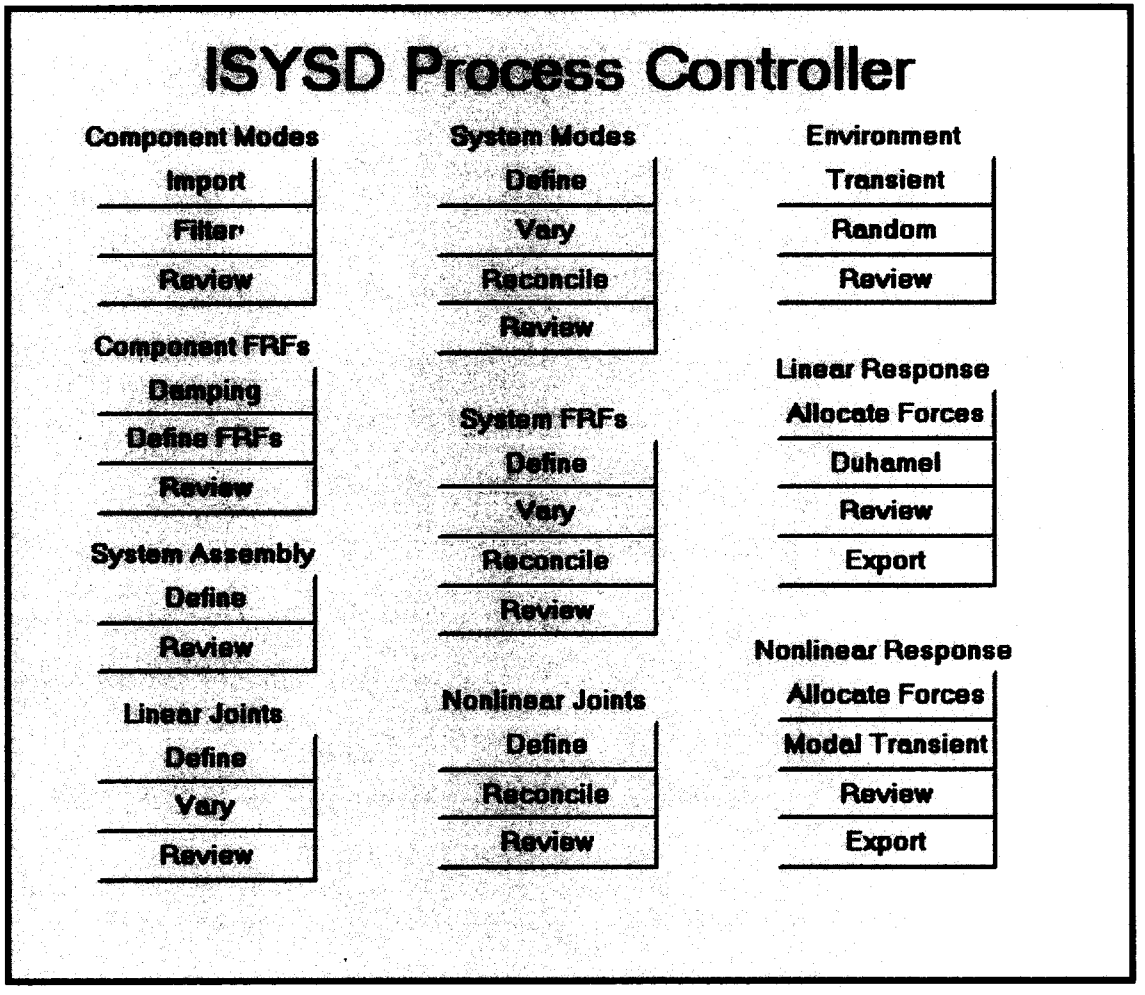
TPF Terrestrial Planet Finder Mission

A NASA Origins Mission

Front Panel Push-Button GUI



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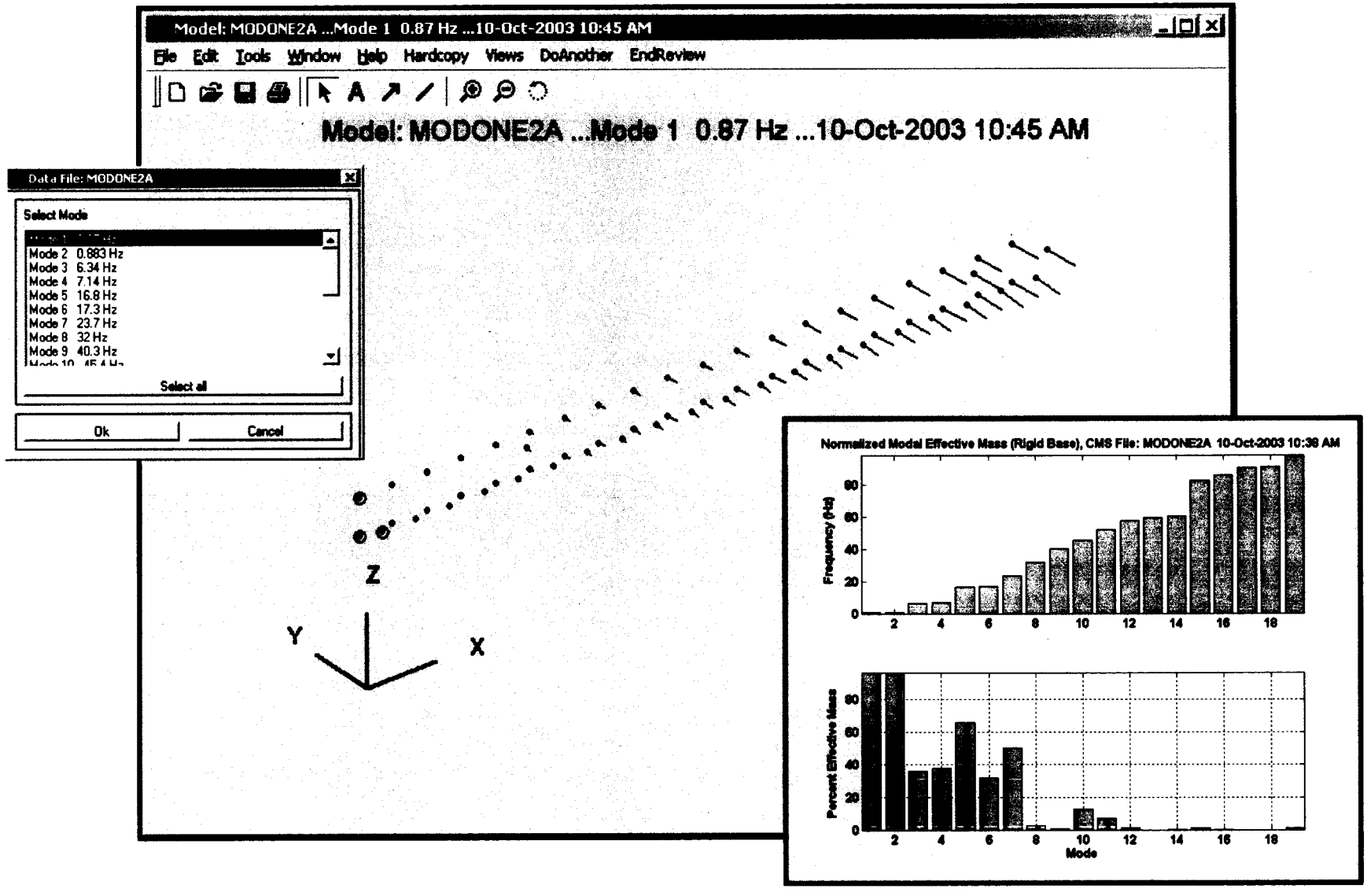
Component Modes Function Group

Terrestrial Planet Finder Mission

TPF



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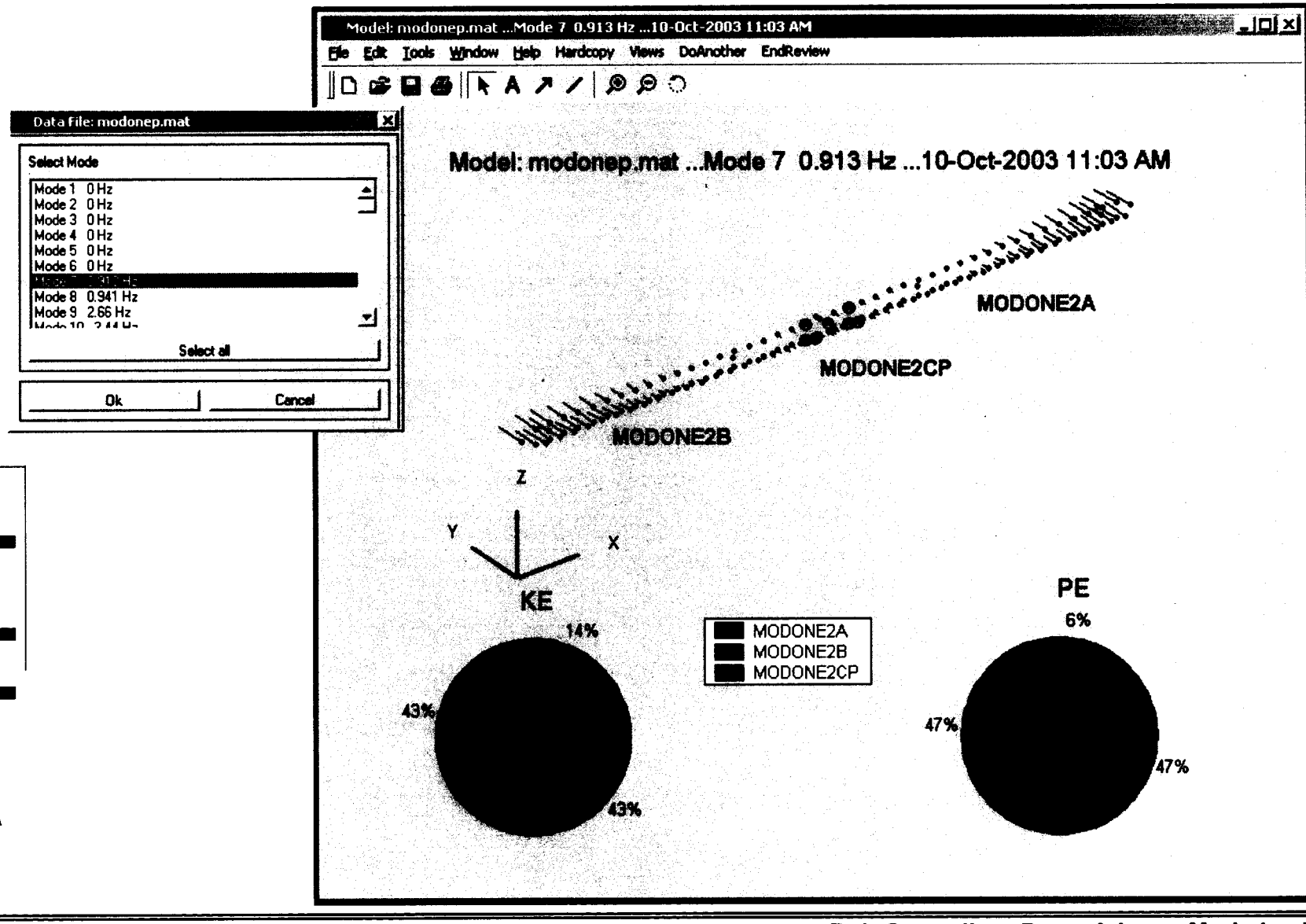
System Modes Function Group

TPF Terrestrial Planet Finder Mission



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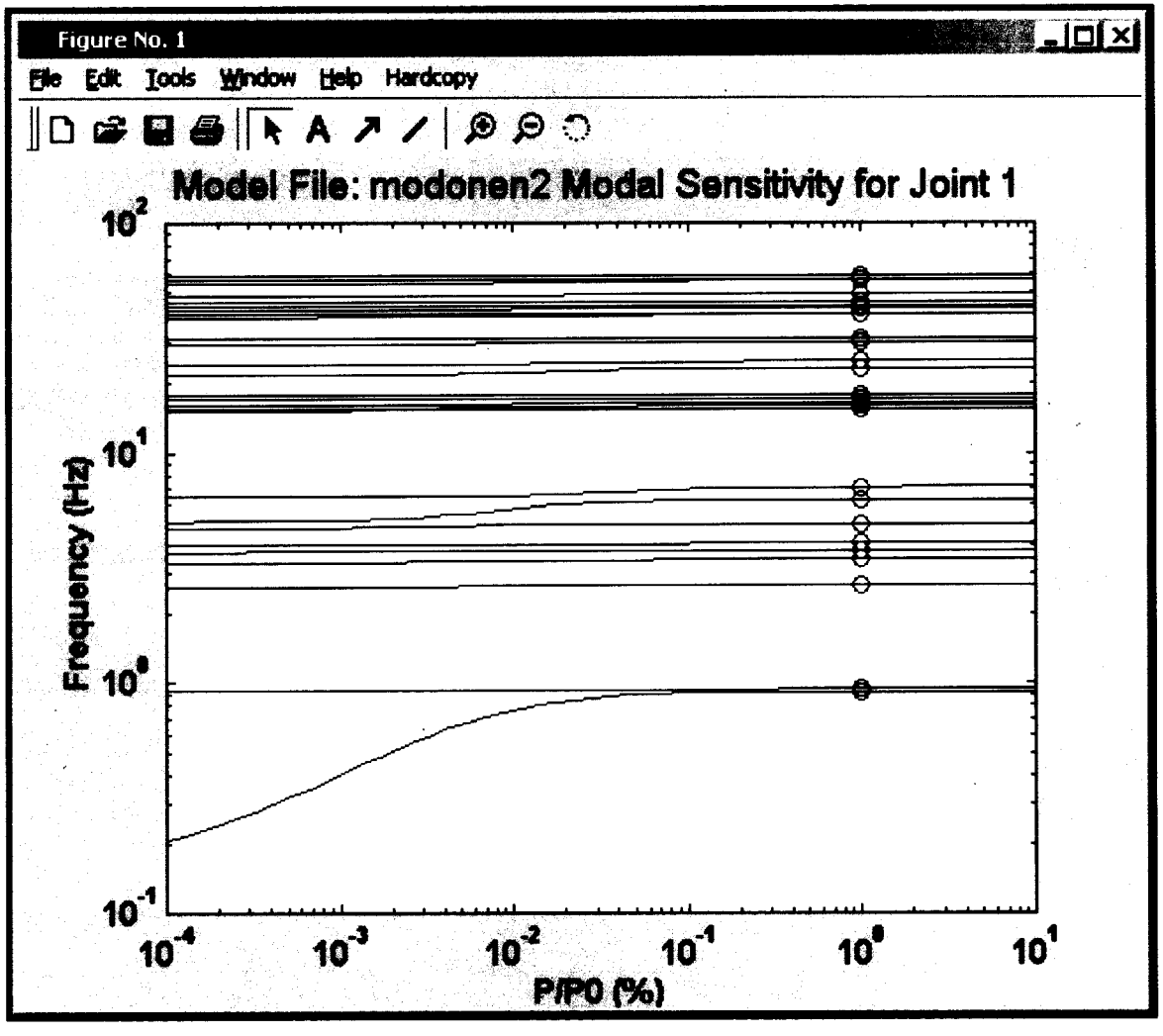
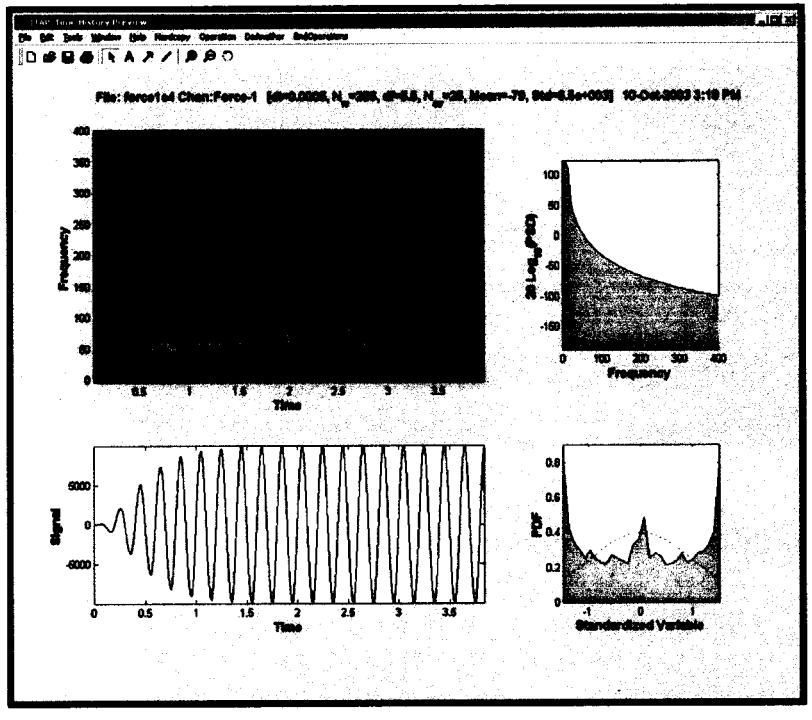
Modal Sensitivity to Joint Stiffness Variation



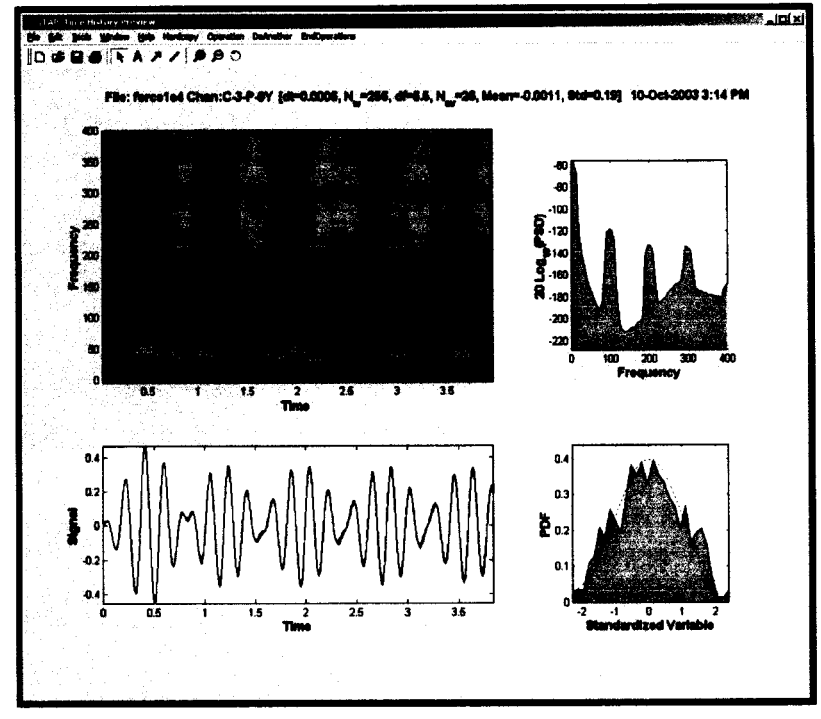
Nonlinear Response Function Group

TPF Terrestrial Planet Finder Mission

Applied 5 Hz Force in Y Direction



Joint Friction Response (Force)



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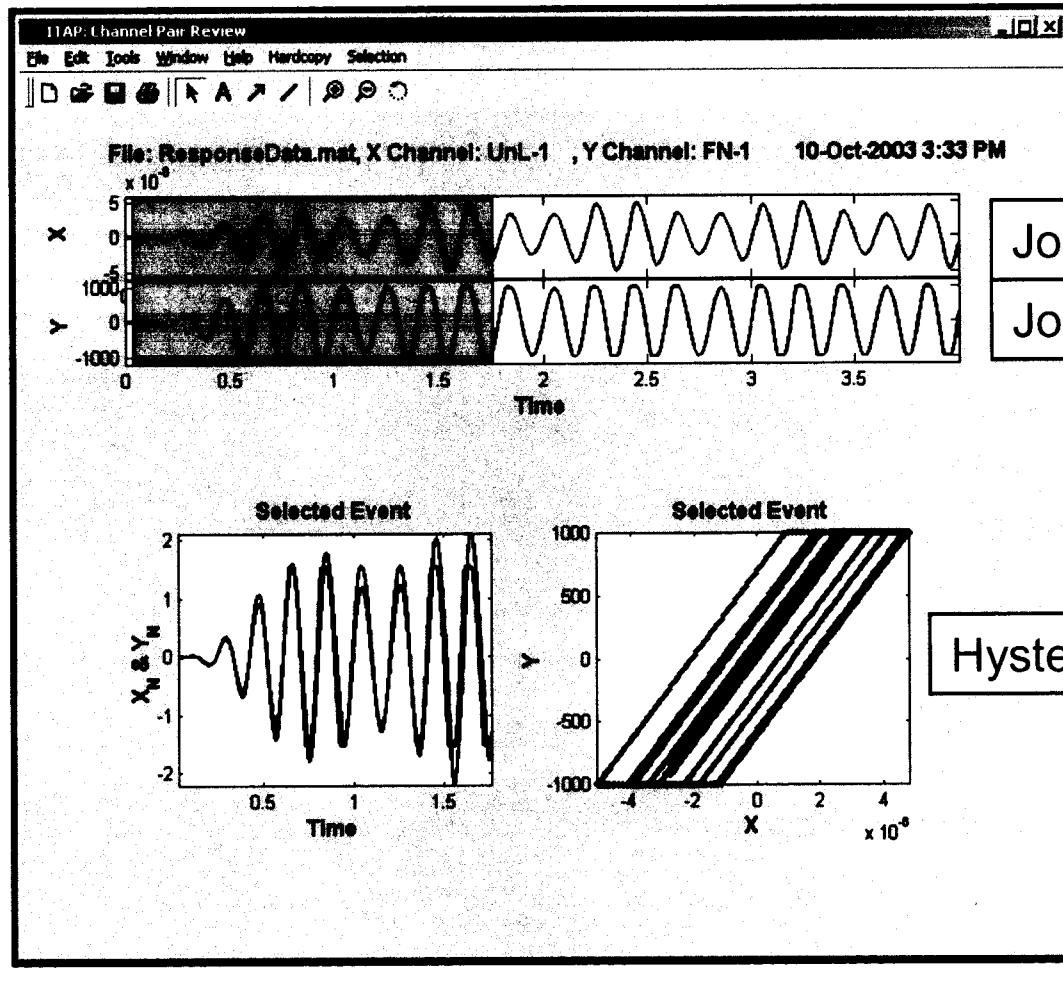
Export of Response Data & Post-Processing in ITAP



Joint Deflection

Joint Force

Hysteresis Loop

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Terrestrial Planet Finder Mission

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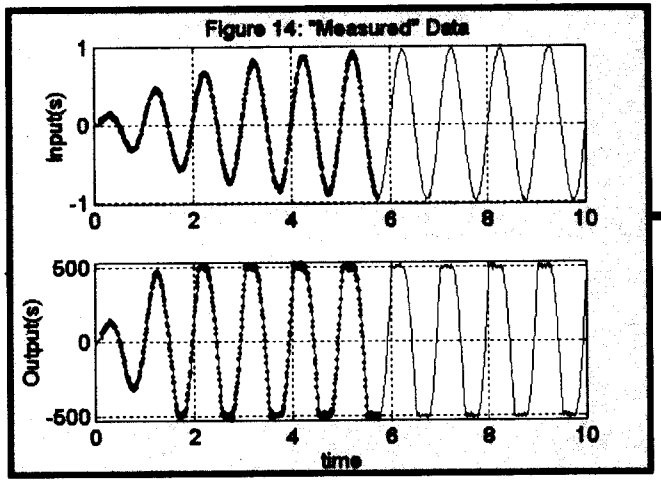
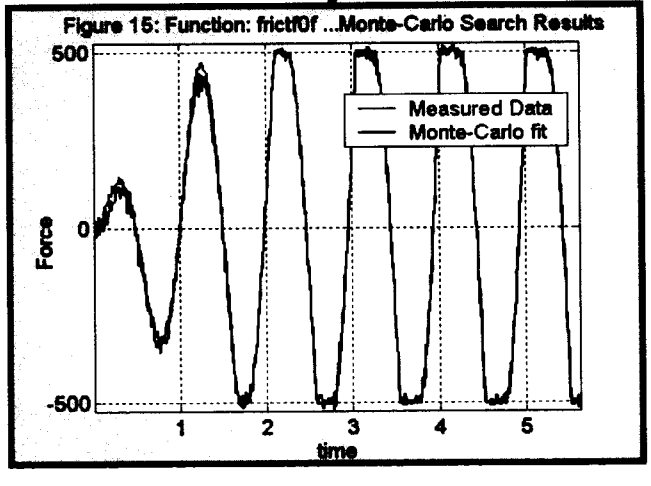
Reconciliation of Joint Test and Analysis Data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