

OVERVIEW

Observer® is Digitex Systems' most advanced post-processing software suite for Structural Health Monitoring (SHM). It provides engineers, researchers, and operators with a powerful platform for advanced signal analysis, Operational Modal Analysis (OMA), and comprehensive reporting. Observer builds upon the Vista platform with extended analysis capabilities, new OMA algorithms, a professional geometry editor, and advanced 3D visualization, making it the ultimate tool for extracting actionable insights from monitoring data.

DESCRIPTION

Observer combines professional data viewing, filtering, and signal processing with advanced OMA methods and geometry-based visualization. The interface is modern, logical, and customizable, designed to simplify complex analysis workflows for SHM specialists. Users can import MiniSEED or ASCII files from Digitex Sentry devices or third-party systems, configure extensive processing options, and carry out both basic analysis (FFT, PSD, spectrograms, auto-correlation) and advanced OMA workflows.

Key OMA functionalities include support for multiple algorithms (FDD, EFDD, FSDD, SSI-Data, SSI-Covariance, and PLSCF), stabilization diagrams, and SVD-based picking. Observer also provides frequency-domain and time-domain OMA analyses, with interactive charts such as SDOF Bell functions, auto-correlation plots, fitted exponential decay, singular value plots, and frequency-damping clustering.

A fully integrated geometry editor allows users to build structural models with points, lines, and surfaces, associate measurement channels, and visualize animated mode shapes in 3D. Animations include rotation, zoom, color scaling, and export to GIF for reporting and presentation purposes. Observer also supports single-setup and multi-setup measurements with reference sensors, ensuring accurate identification of structural modes.

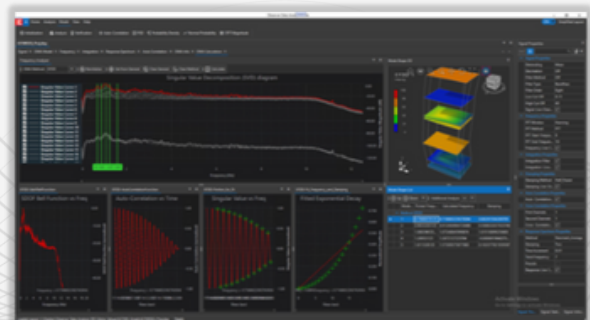
Verification tools include MAC (Modal Assurance Criterion) matrices between different OMA methods, enabling cross-validation of modal parameters and comparative animation of calculated mode shapes. Comprehensive reporting features allow exporting all processed data, charts, statistics, OMA calculations, and results in a single PDF, with user-defined content and company details. Observer can also export proprietary *.ovy files for integration with the Voyager OMA plugin for real-time monitoring and anomaly detection.

APPLICATIONS

- Bridges – modal testing and continuous monitoring
- Dams and hydropower plants – vibration assessment and safety verification
- High-rise buildings – dynamic response to wind or seismic events
- Tunnels and pipelines – resonance and stability analysis
- Mines and industrial plants – vibration safety and process optimization

KEY FEATURES

- Advanced Signal Processing: Time-domain filtering (Butterworth, Chebyshev, Bessel, Elliptic), detrending, decimation, FFT/PSD, spectrograms, response spectrum analysis.
- Comprehensive OMA Methods: Support for FDD, EFDD, FSDD, SSI-Data, SSI-Covariance, and PLSCF for robust modal parameter estimation.
- OMA Visualization & Picking: Singular Value Decomposition (SVD) diagrams, stabilization charts, frequency picking, and damping estimation.
- Geometry-Based Analysis: Advanced 3D geometry editor with point/line/surface modelling, channel association, import/export in proprietary or Excel formats.
- 3D Mode Shape Animation: High-quality animations of mode shapes with rotation, zoom, scaling, and colour intensity visualization; export animations to GIF.
- Multi-Setup OMA: Supports single or multi-setup campaigns with reference sensors for large structures.
- OMA Verification: MAC matrix generation between methods, comparative model animations, and cross-validation of results.
- Statistical & Informational Analysis: Auto-correlation, PSD, probability density, normal probability plots, STFT magnitude heatmaps, and more.
- Comprehensive Reporting: Generate configurable PDF reports with signal metadata, statistics, charts, OMA results, animations, and user details.
- Integration with Voyager: Export *.ovy files for use with the Voyager OMA plugin to enable continuous real-time modal tracking.
- Highly Customizable UI: User-friendly interface, customizable chart layouts, and advanced property settings for all methods and filters.



SPECIFICATIONS

General

- File Import:** MiniSEED and ASCII (CSV/TSV) files; compatible with Digitex and third-party measurement systems.
- User Interface:** Desktop GUI with workspace/session management, multi-plot layout, and batch processing tools.
- Data Handling:** Multi-channel projects; channel metadata (units, scaling); project save/load; export of figures, charts, animations, tables, and results.
- Visualization:** Advanced data visualization plots, highly user configurable.
- Operating Systems:** Windows 10/11 (64-bit).
- Integration:** Seamless workflow with Voyager® (acquire → analyze), Vista® (viewer/reporting), and standard MiniSEED/ASCII pipelines.
- Backup:** Automated saving of user configuration and default settings.
- Software Updates:** Software updates via standard setup installation wizards.
- Licensing:** Observer® operates under a Proprietary Digitex Systems license (node-locked or per-seat, per contract).

Time-Domain Processing

- Detrending:** Mean, linear, polynomial
- Decimation:** 1/2, 1/4, 1/8
- Filtering:** Butterworth, Chebyshev I, Chebyshev II, Bessel, Elliptic; low-pass, band-pass, high-pass
- Integration:** Acceleration → Velocity → Displacement
- Correlation:** Auto-correlation, Cross-correlation

Frequency-Domain Processing

- FFT:** FFT using selectable windows: Hanning, Hamming, Blackman, Bartlett.
- PSD:** PSD estimation with configurable segment/overlap/window options.

Statistical Information

- Channel Statistics:** Auto extracted/calculated metrics such as sampling rate (SPS), maximum and minimum values, average (AVG), standard deviation (STDev), RMS, skewness (SKEW), and kurtosis (KTS)

Response Spectra

- Elastic Response Spectrum:** Damping ratios: 1%, 2%, 3%, 4%, 5%, 10%
- Analysis range:** Frequency range and resolution for response spectrum analysis, including configurable frequency increment and end frequency parameters.

Operational Modal Analysis (OMA)

- Methods:** FDD, EFDD, FSDD, SSI-Data, SSI-Covariance, PLSCF
- Outputs:** Natural frequencies, damping ratios, mode shapes
- Tools:** SVD diagrams, Stabilization diagrams, peak picking.

Per channel analysis: Autocorrelation, PSD, Probability Density, Normal Probability, STFT Magnitude.

Helper functions: SDOF bell curves, autocorrelation plots, fit portion selection, and fitted exponential decay analysis, frequency damping clustering for enhanced interpretation and validation of modal results.

Visualization & Validation

3D Mode Shape Animation: For selected frequencies (geometry editor & DOF mapping)

MAC Verification Matrix: For mode shape correlation/consistency checks.

Plots: Multi-panel plots (time history, FFT, PSD, RS) with cursors and annotations.

Reporting & Export

Report: Generates advanced PDF reports summarizing all user activities, including images, tables, statistics, and graphical visualizations.

Figures: High-resolution plot export (PNG)

Tables: ASCII exports of spectral parameters, modal results, MAC matrix.

Projects: Save/load complete analysis sessions; templates for repeatable workflows

