

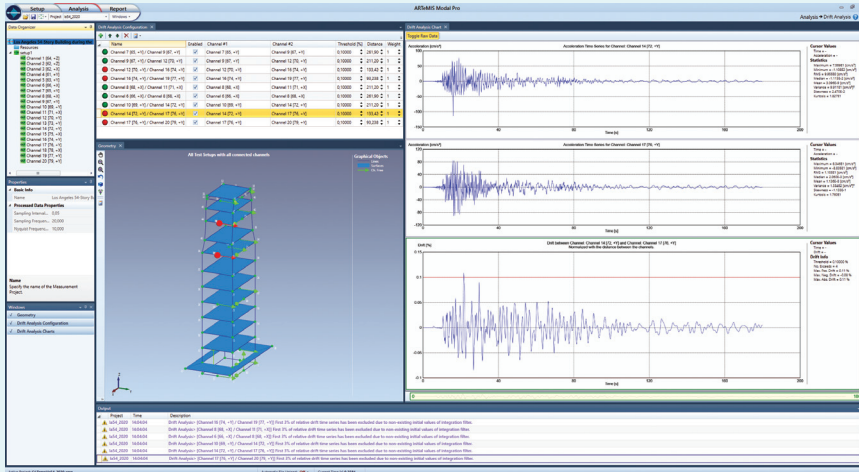
Interstorey Drift Analysis
with ARTeMIS Modal



The Drift Analysis Module is designed to analyze interstorey drift based on measurements from sensors located at the top and bottom of structural elements. These elements can e.g. be columns. If the drift exceeds a certain percentage of the distance between the sensor locations, the module will automatically alert the user.

DRIFT DEFINITIONS

Drift analysis is typically made on many critical elements on a structure. For each observed element, a drift definition is made. This definition includes the sensors, the critical relative drift ratio and what weight an alarm from this element should have for a user alert. Drift analysis can be made on a single or multiple analysis sessions projects. The analysis is set up in the Drift Analysis Task, where the analysis results of the currently active analysis session can be inspected. By selecting a drift definition, the records from the two corresponding channels can be viewed.



Drift analysis of a 54 storey building in Los Angeles during the 1994 Northridge Earthquake. The critical relative drift ratio has been set to 0.1%, which has triggered four out of the nine drift definitions. The selected definition has triggered one time shortly after the most intense shaking.



Drift analysis is a powerful tool for the study of growing damage in structural elements. Here the relative drift of two structural elements is observed. It has been calculated using 22 measurements on a structure exhibiting an increasing damage. The two curves in the top diagram depicts the development of the relative drift of each of the two structural elements. The damage affects the structural element corresponding to the blue curve most. In the diagram at the bottom, a damage indicator of the overall structural integrity is also shown for the same 22 measurements (available using the damage detection module). It is clear to see that damage starts at the ninth measurement, where damage indicators turn red, and the relative drift ratios start increasing significantly.

The records are either the original accelerations or the processed displacements. In addition, the relative drift time series is displayed. This time series is obtained by subtracting the two displacement time series and dividing with the physical distance between the sensors. Alerts are issued if the absolute value of this relative drift time series exceeds the critical relative drift ratio. Additional information is available: number of times the critical relative drift ratio has been exceeded, the absolute largest as well as the minimum and maximum relative drift values found.

When selecting a drift definition, the corresponding sensors are graphically highlighted in the geometry, to allow easy identification of the location of the structural element.

Continuous Monitoring and Drift Analysis

The interstorey drift analysis module seamlessly integrates into the Analysis History Task along with all the other methods for Structural

Health Monitoring in case of continuous monitoring of structural integrity.

If a structure is monitored by ARTEMIS Modal Pro and if drift definitions has been defined in the Drift Analysis Task, then the development of the relative drift values over time can be viewed in the Analysis History Task. In the diagram curves of each of the drift definitions are presented. The values that are presented are measures of the processed drift time histories. These values are absolute largest, RMS value, minimum and maximum values. Also, number of exceedances per analysis session can be visualized.

In case the uploaded time histories from the sensors are continuous in time, then ARTEMIS Modal can be instructed to use the final integration filter coefficients of an analysis session as the initial filter coefficients in the proceeding analysis session.

ARTEMIS Modal – IDA

More information about ARTEMIS Modal/IDA is available on our website:
<http://svibs.com/SHM>



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