



Information Technology and Software

Software Tools to Process Time History Data for Display and Analysis

Novel system has applications for aerospace, manufacturing, and scientific research industries

NASA's Armstrong Flight Research Center innovators have developed a suite of software tools that enable powerful and efficient processing of time history data. These novel tools can be used together or independently, offering a variety of capabilities including comparison of time history data files to validate pre-processing activities, conversion from a compressed format to any format suitable for display, and plotting of data from multiple runs and input files using various time-function parameters. Originally developed to process flight test and simulation data, this suite has potential applications for the manufacturing, aerospace, and scientific research industries. These technologies offer a low-cost alternative to expensive, multiple-component data processing and plotting systems.

BENEFITS

- **Powerful:** Processes large amounts of data from multiple sources and allows users to convert data files from one format to another
- **Efficient:** Time-tags data files, enabling time-range processing of a selected parameter or set of parameters
- **Fast:** Reads and plots data in a fraction of the time required for conventional data-plotting utilities
- **Simple:** Offers a graphical user interface for command input and data plotting
- **Economical:** Works without back-end processing systems, databases, or networks

technology solution



NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

THE TECHNOLOGY

Processing and plotting large amounts of data can be time consuming and expensive, particularly for data that specify time-varying values, so-called time history data. NASA Armstrong's suite includes three components that manage several key operations for time history data, enable comparison of the time history files, and efficiently plot gigabytes to terabytes of data.

DthData is designed to extract selected signals and time segments from input files and write the selected data to output files. Other capabilities include converting file formats, merging data from multiple input files, time skewing, interpolating to common output frame times, renaming signals, and generating calculated output signals as functions of the input signals. The utility also converts time history files from a compressed format to any format suitable for displaying or plotting, including that of external tools such as MATLAB® or Microsoft Excel®.

DthDiff is a utility that compares time history files. In addition to configuring the nature of comparisons, users can specify a precision tolerance and perform a check for a specified number of significant digits. Alternatively, they can use absolute, relative, and percent tolerances to perform the comparison. Program output can be used in Armstrong's QuickPlot and other software to display results. Summary output also indicates the number of samples that fail specified tolerance tests.

QuickPlot is a general-purpose plotting tool developed to read and plot time history data files generated during flight testing and simulation projects. This utility offers a flexible data interface that enables users to read data files in a variety of formats, including those developed using the MATLAB®. Commands can also be scripted and read from an input script file. Users can plot data from multiple runs and multiple input files and manipulate data signals with algebraic expressions.

Why It Is Better

Conventional pre-processing and plotting utilities are time consuming, expensive, and often require multiple component systems that include databases and network systems. This technology suite offers a low-cost, fast, and powerful alternative for users who may not have the resources or time for other approaches. This suite is ideal for applications in the aerospace, manufacturing, and scientific research industries.

APPLICATIONS

The technology has several potential applications:

- Flight testing and simulation projects
- Manufacturing processes
- Scientific research
- Earth climate modeling and simulation
- Retail transaction and delivery analysis
- Economic market modeling

PUBLICATIONS

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