Plato 2.0 Release Notes

Overview

Plato 2.0 is the first release of Plato on a new Multiple Program Multiple Data (MPMD) architecture called Plato Engine. This architecture was developed to provide an extendable environment for adopting new physics objectives in the future. This first release on the new architecture is not only a migration of the existing Plato 1.2 capabilities to the new architecture, but also contains a significant new feature: optimization under uncertainty (see below). This release also contains some important new benefits that come along with the new Plato Engine architecture.

Benefits of Plato Engine Architecture

Enhanced Parallelism. The new Plato Engine architecture enables objectives to be allocated their own instance of the physics code running on its own set of processors so that all objectives can be calculated simultaneously. Each objective can be allocated a different number of processors. This also means that any number of physics codes that have been modified to communicate with the Plato Engine architecture can be run in a single optimization problem. Currently, Sierra-SD is the only production physics code that is released with the Plato product, but we have demonstrated the use of other codes with the Plato Engine as well. The leveraging of Plato Engine’s enhanced parallelism is also seen in multi-load problems and problems with load uncertainty.

Generalized User Interface/Experience. The Plato Engine architecture is not tightly coupled to any single physics code but orchestrates the use of any number of physics codes to solve a topology optimization problem. During problem setup the user is no longer setting up physics code-specific input decks but rather working at a higher level defining objectives and constraints and indicating what physics will be used for each. The result is a much cleaner, simpler “plato” input deck that is more focused on the important aspects of topology optimization.

Topology Optimization under Uncertainty

Plato 2.0 offers an initial capability for optimizing under uncertainty. The user can specify that a load has orientation uncertainty and Plato will automatically calculate an optimized set of load cases for representing that uncertainty. The result is designs that are more robust to load orientation variation. The generic framework put in place to support this initial capability will facilitate future uncertainty capabilities as well. See the User’s Manual for more details about how to setup a problem with load orientation uncertainty.

Enhanced Fringe Plotting Support for Multi-load Problems

Plato 2.0 has been enhanced to support fringe plotting of displacement and Von Mises Stress for multi-load problems. Now you can choose which load case you want to see displacements of stresses for.

Input Deck Parameter Changes

The move to the Plato Engine architecture necessitated a move from physics code-
specific input decks to a generalized “Plato” input deck that is not specific to a given physics code and which is designed specifically for topology optimization problems that can support multiple physics codes. As a result, the input deck has changed substantially in Plato 2.0. The User’s Manual has a detailed description of all of the new input deck parameters. Furthermore, the Plato tutorials have all been migrated to the new input deck for version 2.0.

**Improved Input Deck Error Checking**

Various input deck checks have been added to catch common user errors before submitting a job. Errors are flagged in the input deck editor in the graphical user interface so that the user can address them before submitting the job.

**Known Capability Regressions in Moving to the Plato Engine Architecture**

Multi-material functionality has not been migrated to the new Plato Engine architecture yet. If you need to use multi-material capabilities, you will need to continue to use Plato 1.2 for this.