ABSTRACT OF THE INVENTION

TITLE OF THE INVENTION: Method and computerized system for robust engineering and optimization of complex phenomenon.

In many systems and processes of science and engineering, the boundary conditions and physical phenomena are so complex that it is beyond the present technical capability to obtain satisfactory analytical or numerical models. As such, robust engineering and experimentation is necessary to define the behavior of the system and/or processes. The invention described herein relates in general to a method and computerized system for robust engineering and optimization of complex phenomenon, and more particularly, to a guided methodology, which dictate the proper sequence and techniques for robust engineering, characterization and optimization; and a computerized system which allows a user through a wizard-based graphical-user-interface to plan-setup-create robust engineering model and to evaluate its parameters; and to automatically compute-analyze-optimize-verify the robust engineering model with the help of a task-specific knowledge based system and optimization algorithms; and together with a system to track-store-retain the scientific knowledge for future usage. This invention uses the convergent and integration of a set of multi-disciplinary technologies, mainly robust design engineering, knowledge-based system, statistical sciences and advanced software engineering, to provide a practical approach to the art of experimental designs and analysis techniques for robust engineering, characterization and optimization to achieve optimal design solutions that are insensitive to disturbances. This invention provides simultaneous characterization and optimization of several factors can be studied at the same time making it possible to gain insight into their simultaneous effect on the response variable and gain an understanding of the relationship between the input factors and the response, and interaction effects among the various parameters a quick and efficient method solving new and evolving complex phenomenon for industries such as manufacturing, processes, biotech and pharmaceuticals.