



A Subsonic Aircraft Design Optimization with Neural Network and Regression Approximators

By Surya N. Patnaik

BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 28 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. The Flight-Optimization-System (FLOPS) code encountered difficulty in analyzing a subsonic aircraft. The limitation made the design optimization problematic. The deficiencies have been alleviated through use of neural network and regression approximations. The insight gained from using the approximators is discussed in this paper. The FLOPS code is reviewed. Analysis models are developed and validated for each approximator. The regression method appears to hug the data points, while the neural network approximation follows a mean path. For an analysis cycle, the approximate model required milliseconds of central processing unit (CPU) time versus seconds by the FLOPS code. Performance of the approximators was satisfactory for aircraft analysis. A design optimization capability has been created by coupling the derived analyzers to the optimization test bed CometBoards. The approximators were efficient reanalysis tools in the aircraft design optimization. Instability encountered in the FLOPS analyzer was eliminated. The convergence characteristics were improved for the design optimization. The CPU time required to calculate the optimum solution, measured in hours with the FLOPS code was reduced to minutes with the neural network approximation and to seconds with the...



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