A Compromise Between Simplicity & Accuracy of Nonlinear Reduced Order Systems

Abstract:
This report considers the problem of complexity in reduced nonlinear models derived by the so-called system matrices optimization method. The solution suggested here is adding a class of secondary conditions that impose a simpler structure on the reduced model. Distinct choices of these conditions have different impacts on the accuracy of the reduced model, therefore a pioneered search based on genetic algorithms is proposed that finds the optimal choice of conditions. By means of two examples, it is illustrated that this method can effectively compromise between simplicity and accuracy of the reduced model. In order to improve the numerical efficiency of the solution and to speed up the pace of convergence some enhancements are presented.