Design Optimization of High Speed Laboratory Centrifuges Using An Evolutionary Strategy

Jens Strackeljan, Xue Feng, Dietrich Behr

Technical University of Clausthal
Institute of Applied Mechanics
Graupenstr. 3, 38678 Clausthal-Zellerfeld, Germany
Phone: 0049-(0)5323-72-2057, Fax: 0049-(0)5323-72-2337
jens.strackeljan@tu-clausthal.de, xue.feng@tu-clausthal.de

ABSTRACT

Applications for the methods used in soft computing, such as genetic and evolutionary algorithms, neuronal networks and fuzzy logic, are growing even in those areas of machine construction hitherto reserved exclusively for model-supported simulation programs. By way of example, this article shows how an evolutionary algorithm can help solve a longstanding problem related to optimizing the design of modern laboratory centrifuges. Along the way, it gives detailed attention to stable operation in a rapidly turning rotor system. Of course, similar applications are conceivable for a wide range of other designs.

Keywords: High Speed Rotor Systems, Design optimization, Evolutionary Strategy, Stability , Internal Damping.