

A novel method for moments of inertia tuning for free-flying dynamically similar models via simulated annealing

Ali Shakoori, author

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Abstrak

In this study, a method was developed for tuning moments of inertia for a free-flying dynamically similar/scaled model of an aircraft. For this method, the simulated annealing optimization algorithm was used to obtain similar mass-inertial properties of the model and the full-scale aircraft utilizing ballast weights. For a scaled model of a Su-27 fighter, the ballast arrangement were designed and weights were determined to achieve the required center of gravity position and the moments of inertia based on the similitude requirements. A computer code was developed, and the task of tuning inertia properties was performed. The results showed that the proposed optimization approach was successfully used to determine a feasible ballast weight and position. Moreover, the ballast weight reduced from 8.66 kg to 4.86 kg using the proposed technique, and the inertia characteristics' non-similarity was minimized.