Optimal design of energy storage flywheel rotor

Abstract--This paper deals with topology optimization of the rotor of a flywheel energy storage system (FESS). For isotropic materials the constant stress disc (CSD) is the best choice to ...

The energy storage component of the FESS is a flywheel rotor, which can store mechanical energy as the inertia of a rotating disk.

The aim of this study is to design and shape optimization of flywheel rotor with different combinations of diameter and height with constant ...

In the development of the flywheel rotor, current researches have focused on optimum design and stress analysis [1].

The use of optimization methods with mathematical models of the system can considerably shorten design time, and minimize costly `hardware-in-the-loop" design iterations. The energy ...

In this thesis, an open-source optimization framework with shape and topology optimization capabilities was developed for the design of optimal FESS rotors. A suite of 1D, 2D ...

It was concluded that optimal configurations of radial radius ratio and axial radius ratio, in combination with targeted surface roughness, can lower rotor surface temperatures, ...

The energy storage component of the FESS is a flywheel rotor, which can store mechanical energy as the inertia of a rotating disk. This article explores the interdependence ...

Abstract: The objective of this Paper is to carry out a case study in finding an optimal combination of design, material designation and geometry modification of the flywheel which results in ...

This paper aims to answer the question - "Are composite flywheels better suited for energy storage than metal flywheels?". This study uses three different performance indices: ...

The review was divided into the following subject areas: (1) an overview of flywheel energy storage systems, (2) fiber reinforced polymer composites in flywheel energy storage, (3) ...

In this paper, a rotor dynamics analysis of a Flywheel Energy Storage System rotor was carried out by Prohl-Myklestad method, got the critical speeds and unbalance response which are ...

Optimal design of energy storage flywheel rotor

In order to improve the energy density of energy storage fly-wheel, topology optimization method exploring the structural layout of the flywheel rotor geometry is presented in this pa-per.

In what follows, two design optimization case studies will be presented: (1) The optimization of the discrete fiber angles for a multi-rim hybrid composite rotor and (2) the investigation of the ...

A comparative study between optimal metal and composite rotors for flywheel energy storage systems Article Full-text available Nov 2018

The aim of this study is to design and shape optimization of flywheel rotor with different combinations of diameter and height with constant rotational speed, energy storage ...

Flywheel energy storage systems store kinetic energy by constantly spinning a compact rotor in a low-friction environment. When short-term back-up power is ...

Literally hundreds of publications describing a tremendous variety of composite flywheel rotor designs have appeared in the literature since the advent of new, affordable, high ...

PDF | On Sep 22, 2011, Malte Krack and others published Rotor Design for High-Speed Flywheel Energy Storage Systems | Find, read and cite all the research ...

Flywheels are mechanical devices that store energy as the inertia of a rotating disk. Flywheel Energy Storage Systems (FESS) can combat the challenges of intermittency and unreliability ...

The composite flywheel rotor has characteristics of distinctively high-energy density, long life and light weight. The essential components of a flywheel energy storage system are a ...

Flywheel Energy Storage System is an efficient and environmental friendly battery, and a rotor dynamics analysis is necessary as the rotor working in a high rotating speed. In this paper, a ...

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