## Popular science review

**Title: "Study of a supercapacitor solution as a replacement of an energy storing motor of 1500 kW at OKG 3 nuclear reactor"**

In the intricate landscape of nuclear reactor operations, the reliable functioning of critical components, specifically head circulation pumps, is of paramount importance. This master thesis delves into a discreet yet significant advancement: the examination of a supercapacitor group to refine the control of pump speeds in the event of external electrical grid failures.

Traditionally, the reliance on flying-wheel motors to supplement energy during speed reduction has faced challenges, notably maintenance issues like sliding-bearing problems. This study takes a pragmatic approach, investigating the potential of supercapacitors as a sophisticated alternative to address prevailing inefficiencies.

The research methodology is characterized by meticulous analysis, covering an in-depth examination of energy and power requirements, preliminary sizing of essential components, and a simulated evaluation of the proposed supercapacitor-based system. The overarching goal is to enhance the reliability of nuclear reactor operations and concurrently mitigate maintenance costs associated with head circulation pump speed control during electrical grid failures. This scholarly inquiry aims to provide a grounded contribution to the ongoing refinement of nuclear technology.

The empirical findings of this research project are encouraging. Supercapacitor technology emerges as a practical and viable solution, aligning seamlessly with the stringent security and performance standards expected in nuclear applications. Furthermore, from an operational maintenance standpoint, the supercapacitor-based system presents itself as a promising avenue for potential cost reductions.

Consider a scenario where pump speeds adjust seamlessly during electrical grid failures, ensuring system safety with precision. The proposed supercapacitor-based system not only addresses existing maintenance challenges but signifies a step towards a future where nuclear reactors operate with increased reliability during grid failures with a reduced maintenance cost.

In the context of the OKG nuclear plant, this research offers a positive and tailored contribution, potentially enhancing operability, especially as the facility considers long-term operation strategies. Positive outcomes underscore the viability of the innovative approach, setting the stage for a laid-back exploration of a comprehensive technical analysis and sizing of nuanced components. This nudges the nuclear industry towards a future marked by enhanced efficiency, reliability, and safety, specifically catering to the unique operational landscape of the OKG plant.

**Iván Arenas Kelbelova**