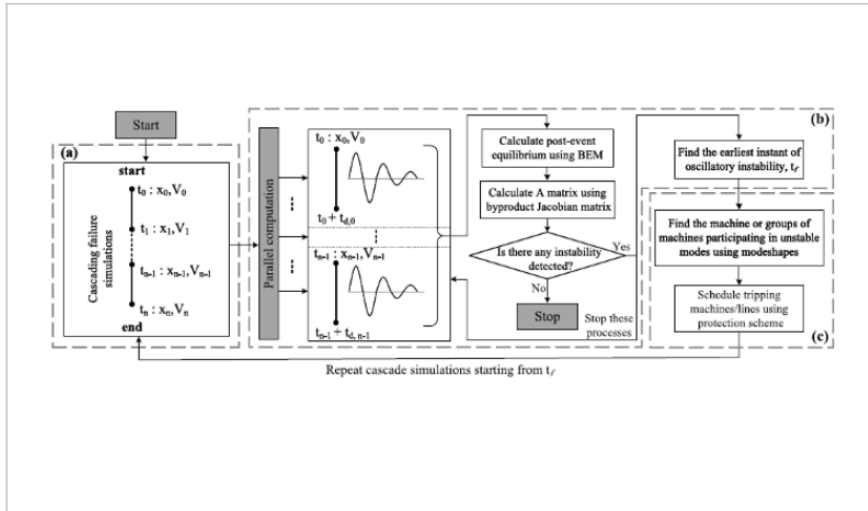


# A New Approach for Fast Long-Term Simulations in Power Systems

ID# 2021-5343



## TECHNOLOGY READINESS LEVEL

4

### Seeking

Investment | Licensing | Research

### Keywords

- Machine monitoring
- Implicit Backward Euler Method
- Long term simulation
- Stiff solvers
- Power system simulation

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## Technology Summary

The disclosed technology presents a novel method for machine monitoring. The method uses a fast time-domain cascading failure simulation approach based on implicit Backward Euler method (BEM) with stiff decay property. The method exploits a predictor-corrector approach (PC-approach) to fully address the hyperstability issue in BEM and utilizes an adaptive center of inertia (COI) reference frame-based approach. Its utility is compared with Trapezoidal method (TM) for numerical integration.

## Application & Market Utility

Long term simulation (e.g. blackout simulation) of realistic power grid in commercial simulation software takes hours, which prohibits statistical analysis involving thousands of such simulations. The proposed technology tracks the exact cascade path and replicates the end results of standard dynamic simulation while significantly (>10x) reducing the simulation time. The results are contrasted with traditional dynamic simulation on the 2,383 bus Polish system. The proposed predictor-corrector method overcomes the hyperstability issue of using stiff solvers in power system simulation packages. The end users of this technology include American institutions, National Laboratories, power grid research institutes, utilities, and independent system operators (ISOs).

## Next Steps

The research team is seeking licensing opportunities.