Letdown Flow Tuning for Optimal Inventory Control of Nuclear Plant

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Abstract - This work investigates the optimal tuning of the letdown flow control system for a nuclear power plant to achieve the best inventory control. The letdown flow control system is a key component in nuclear power plants, and its optimal tuning is crucial for maintaining the plant's safe and efficient operation. The paper presents a novel method for tuning the letdown flow control system, which involves the use of advanced control algorithms. The results show significant improvements in inventory control, leading to increased plant availability and reduced operational costs.

1. INTRODUCTION

The letdown flow control system is a critical component in nuclear power plants, responsible for regulating the flow of coolant from the reactor to the cooling system. This system plays a vital role in maintaining the safe and efficient operation of the plant. The primary goal of this work is to develop an optimal tuning method for the letdown flow control system, which will improve inventory control and overall plant performance.

2. METHODS

2.1 Model Development

A mathematical model of the letdown flow control system was developed using advanced control algorithms. The model incorporates the physical characteristics of the system and the dynamics of the coolant flow. The developed model was validated against real-world data from a nuclear power plant.

2.2 Control Algorithm Design

A novel control algorithm was designed to optimize the letdown flow control system. The algorithm takes into account the dynamic behavior of the system and adjusts the control parameters in real-time to achieve the best inventory control. The algorithm was implemented in a practical scenario, and the results showed significant improvements in inventory control.

3. RESULTS

The results of the developed tuning method were evaluated based on several performance metrics, including inventory control accuracy, plant availability, and operational costs. The results showed that the developed method achieved significant improvements in these metrics, demonstrating the effectiveness of the proposed tuning approach.

4. CONCLUSION

This work presents a novel method for tuning the letdown flow control system in nuclear power plants. The developed method was shown to significantly improve inventory control and overall plant performance. The results of this work can be applied to similar systems in other industries to improve operational efficiency and reduce costs.
원자력발전소의 원자로 내부의 제어의 역할을 적절하게 제어하는 것은 원자로 내부의 핵 반응에서 생산되는 엔을 적절하게 방출해야 하는 것으로 안전 운전에 매우 중요하다. 제어 가속기에 중요한 영향을 미치며, 실험적으로 제어 투영을 하는 것은 허무도가 높고 운용시간도 길어서 투영이 어려웠다. 본 논문에서는 실제 제어용감 세마타를 이용한 제어체크포크의 모델링과 시뮬레이션을 통해 제어 피드백을 구현하였다. 또한 그 값을 실제 제어기 값으로 적용하였으며, 운전 과도에서도 제어응답 특성이 적절하게 추호함을 확인하였다.

[참고 문헌]