

Modeling and Simulation of Elevated Pressure Air Separation Unit in IGCC Power Plant System

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IGCC (Integrated coal Gasification Combined Cycle) power plant is one of the promising power generation methods that can utilize the abundant resource of coal in an environmentally friendly way. This system is much more complex than conventional pulverized coal power plant systems, so the dynamic study of this system is required for the stable and efficient operation.

In this research, Elevated Pressure Air Separation Unit (EP ASU) in an IGCC power plant is studied from the viewpoint of dynamic systems analysis. EP ASU separates air feed into oxygen and nitrogen and sends them to the gasifier and gas turbine parts. It introduces the largest time-lag in the overall plant dynamics and consumes a major portion of the total energy use in IGCC. As a part of a study involving the overall IGCC power plant system, the equation-based modeling of the cryogenic rectification column in EP ASU has been developed using the software platform of gPROMS. Also, the transient behavior in response to various load fluctuations is studied through the dynamic simulation.