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Thermo-elasto bulk-flow model for labyrinth seals in steam turbines

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ABSTRACT

Over the last few decades, the increasing demand on efficiency and performance for steam turbines has resulted in OEMs operating machines near critical conditions of their structural and thermal capabilities.

In this paper, a new thermo-elasto bulk-flow model for labyrinth seals has been introduced. The model includes the bulk-flow model for estimating the dynamic coefficients, heat transfer model for evaluating the temperature distribution in the rotating and stationary parts and structural-mechanics model for calculating the radial growth.

By considering a staggered labyrinth seal installed in the balancing drum of a steam turbine, different operating conditions, such as the boundary pressure, rotational speed and inlet pre-swirl ratio, as well as the stability of the seal are investigated in this study.

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