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Plasma current ramp up stability analysis in JET and JT-60SA

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This project focused on the preparatory work for a master's thesis on magnetohydrodynamic (MHD) stability analysis of the plasma current ramp-up phase in Tokamak devices, with particular attention to the JET and JT-60SA reactors. As nuclear fusion emerges as a promising clean energy source, understanding and controlling instabilities during plasma initiation is essential to improving reactor performance. The report introduces the theoretical framework of ideal MHD, including equilibrium configurations, surface quantities, and the Grad-Shafranov equation. Emphasis is placed on the energy principle, which underpins linear MHD stability analysis, allowing the identification of potential instabilities, either pressure-driven or current-driven, through analysis of the system's potential energy variation.

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