

# THE TRIGGERING OF NEOCLASSICAL TEARING MODES BY SAWTEETH IN THE TCABR TOKAMAK

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This work addresses a pending issue in developing thermonuclear fusion: the triggering of neoclassical tearing modes (NTMs) by sawteeth (ST) in tokamak plasmas. Although ST and NTMs have been intensively investigated in recent decades, a quantitative and validated theory of ST-triggered NTMs is yet to be developed. Specifically, it is not possible to reliably predict the triggering of NTMs in scenarios of ITER operation with high plasma current and sustained operation with power gain factor  $Q = 10$ . In this work, a study is carried out that aims to an improvement of the current understanding of the physical mechanisms behind the triggering of NTMs by ST, combining a theoretical/computational approach in the TCABR tokamak, which is operated by the Plasma Physics Laboratory of the Institute of Physics from the University of São Paulo. The M3D-C<sup>1</sup> code, a state-of-the-art code developed at the Princeton Plasma Physics Laboratory, USA, is used to model plasma evolution. It is expected that the knowledge acquired during this work will lead to the development of strategies that inhibit the coupling between ST and NTMs. This model can then be used predictively to indicate safer operating zones with higher plasma pressure in tokamaks.

\textbf{Keywords:} Thermonuclear fusion, neoclassical tearing modes, sawteeth oscillations, tokamaks, plasma physics.

## Speaker's Affiliation

Instituto Tecnológico de Aeronáutica, São José dos Campos;

## Member State or IGO

Brazil

**Primary author:** ANTONIO PIRES VACCANI, Gustavo (ITA)

**Co-authors:** Mr MACHADO SALVADOR, Felipe (USP); PAGANINI CANAL, Gustavo (University of São Paulo); Prof. ROBERTO, Marisa (ITA)

**Presenter:** ANTONIO PIRES VACCANI, Gustavo (ITA)

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