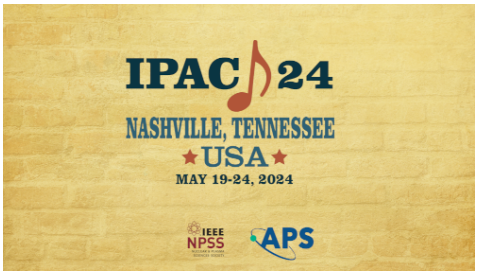

Contribution ID: **588** Contribution code: **TUPR76** Type: **Poster Presentation**

Exploring convective heat transfer coefficients in fully developed flows: a combined CFD analysis and experimental validation for common geometries in particle accelerators

Tuesday, 21 May 2024 16:00 (2 hours)

Within the field of Particle Accelerators engineering, the design of cooling channels for its components has heavily relied on experimental correlations to compute convective heat transfer coefficients. These coefficients are believed to have a conservative factor which end up in oversized designs. The following study assesses this conservative factor for fully developed flows, in the laminar, turbulent and transition regimes. It will also focus on different geometries to do so. With this objective in mind, simulation models have been developed and correlated with experiments carried out at ALBA synchrotron. In the course of this research, various turbulence models and meshes have been examined for the development of the simulations. Heat transfer coefficients were derived from the Computational Fluid Dynamics (CFD) simulations and juxtaposed with empirical correlations. The specific geometries under investigation encompass a circular channel with a 10mm inner diameter, a rectangular section channel, and a pinhole geometry, the latter being frequently employed in accelerator technology.

Footnotes

Funding Agency

Paper preparation format

LaTeX

Region represented

Europe

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Session Classification: Tuesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T31 Subsystems, Technology and Components, Other