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CFD studies and experimental validation of the convective heat transfer coefficient in non-fully developed flows applied to conventional geometries used in particle accelerators

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In the field of Particle Accelerators engineering, the design of the cooling channels of its components has been extensively based on experimental correlations for the calculation of convective heat transfer coefficients. In this scenario, this work is focused on studying whether the experimental correlations are conservative when the flow is turbulent in fully developed and non-fully developed regions.

For this research, simulation models have been developed for turbulent flows in fully developed and non-fully developed regions, all of them for cooling channels with a 10 mm inner diameter. In the first case, for a circular channel, turbulence models have been studied, and comparative studies with respect to experimental correlations and previous studies performed at ALBA have been carried out. Simulation models based on the coefficients obtained from experimentally observed correlations, CFD models and an experimental validation of a mirror with inside cooling, have been performed in the second case.

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Footnotes

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Yes

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