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The present paper deals with thermal fatigue phenomenon, and more particularly with the numerical simulation using Large Eddy Simulation technique of a mixing tee, for which experimental thermal statistics are available. The sensitivity to the sub-grid scale closure is first evaluated by comparing the experimental statistics with the numerical results obtained via both the Smagorinsky and the structure-function models. Because of a difference of temporal resolution between the experiment and the simulation, the direct comparison of the fluctuations is not possible. Therefore, a methodology based on filtering the numerical results is proposed in order to achieve a proper comparison. The comparison of the numerical results with the experiment suggests that slight better predictions are obtained with the structure-function model even if the dependency of the results to the sub-grid scale model is low. Then, the possibility to reduce the fluid computational domain by prescribing synthetic turbulence at the inlet is tested. First results are encouraging and underline the advantage of considering this technique instead of a standard noise at the entrance of the domain. All the simulations are conducted with the commercial CFD code STAR-CD.

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