Abstract Submitted
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Direct numerical simulation of turbulent flow in a channel with different types of surface roughness[1] IGOR A. BOLOTNOV, North Carolina State University — Direct numerical simulation (DNS) was performed for turbulent channel flow ($Re_\tau = 400$) for two types of wall surface roughness and well as smooth walls. The roughness elements of first type were assumed to be two-dimensional, transverse square rods positioned on both walls in a non-staggered arrangement. The height of the rods corresponds to $y^+ = 13.6$ and thus extends in the buffer layer. The second type of roughness was represented by a set of hemispherical obstacles (height of $y^+ = 10$) located on both channel walls and arranged on a square lattice. The presented simulations are part of benchmark problems defined by thermal-hydraulics focus area of the Consortium for Advanced Simulations of Light Water Reactors (CASL). This problem simulates the effect of the presence of growing bubbles on the walls of nuclear reactor fuel rods and aimed on evaluating CFD capabilities of various codes before applying them to more advanced problems. Mean turbulent quantities were computed and compared with available analytical and experimental results. The results of this work will be used to evaluate the performance of other LES and RANS codes on this benchmark problem.

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