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Boiling Rayleigh-Benard flow[1] DANIELA NAREZO, U. Twente, Netherlands / UCSB, Santa Barbara, USA, YANBO XIE, U. Twente, Netherlands, GUENTER AHLERS, UCSB, Santa Barbara, USA, CHAO SUN, DETLEF LOHSE, U. Twente, Netherlands — We report on heat transport due to boiling of Novec7000 (1-methoxyheptafluoropropane) at the bottom plate of a turbulent Rayleigh-Benard sample which was filled with liquid (except for small vapor bubbles when boiling took place). The top surface of the bottom plate was a silicone wafer covered by a triangular lattice of 30 μm diameter and 100 μm deep cavities (the lattice spacing was 100 μm). The plate diameter and sample height both were 10 cm, but only a central bottom-plate area of 2.5 cm diameter was heated. When the cavities were activated (deactivated) by assuring that they were filled by vapor (liquid), then they nucleated (did not nucleate) bubble formation for bottom-plate temperatures T_b larger than the boiling point T_{BP}. Results of the heat transport and of the mid height temperature at the side wall of the sample as a function of T_b with a fixed applied temperature difference $\Delta T = T_b - T_t = 20$K ($T_t$ is the top plate temperature) will be reported. When $T_b > T_{BP}$, the effective conductivity of the 2-phase flow was enhanced relative to the supersaturated 1-phase system by up to 40 percent. The sidewall temperature T_s was reduced in the presence of bubbles by up to 3 percent relative to the 1-phase case.

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