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Experiments on two- and three-dimensional vortex flows in lid-driven cavities TANJA SIEGMANN-HEGERFELD, Institute of Fluid Mechanics and Heat Transfer, Vienna University of Technology, STEFAN ALBENSOEDER, CeBeNetwork GmbH, HENDRIK C. KUHLMANN, Institute of Fluid Mechanics and Heat Transfer, Vienna University of Technology — Vortex flows in one-sided lid-driven cavities with different cross-sectional aspect ratios ($\Gamma = 0.26$ up to $\Gamma = 6.3$) are investigated experimentally. In all cases the spanwise aspect ratio $\Lambda >> \Gamma$ is very large and much larger than most previous experiments. Flow-structure visualizations will be presented together with quantitative LDA and PIV measurements. The experimental results are in good agreement with the critical data from numerical stability analyses and with nonlinear simulations. Experimentally, we find four different three-dimensional instabilities. Particular attention is paid to the so-called C_4 mode which arises at large cross-sectional aspect ratios. When the spanwise aspect ratio is small the first bifurcation of the C_4 mode is strongly imperfect.

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