Video microscopy and particle tracking were used to measure the spatial dependence of the diffusion coefficient ($D_\alpha$) of colloidal particles in a closed cylindrical cavity [1]. Both the height and radius of the cylinder were equal to 9.0 particle diameters. The number of trapped particles was varied between 1 and 16, which produced similar results. In the center of the cavity, $D_\alpha$ turned out to be $0.75D_0$ measured in bulk liquid. On approaching the cylindrical wall, a transition region of about 3 particle diameters wide was found in which the radial and azimuthal components of $D_\alpha$ decrease to respective values of $0.1D_0$ and $0.4D_0$, indicating asymmetrical diffusion. Hydrodynamic simulations of local drag coefficients for hard spheres produced very good agreement with experimental results. These findings indicate that the hydrodynamic particle–wall interactions are dominant and that the complete 3D geometry of the confinement needs to be taken into account to predict the spatial dependence of diffusion accurately.