Abstract

Let $c_k(b,\nu,a)$ be the kth positive zero of the function $bC_\nu(x)+xC'_\nu(x)$, where $C_\nu(x) = cosaJ_\nu(x) - sinaY_\nu(x)$ is the general cylinder function and $0 \leq a < \pi$. WE prove some results on convexity and concavity of $c_k(b,\nu,a)$ with respect to the variable b for $\nu > 0$. In particular, we establish lower and upper bounds for $c_1(b,\nu,0)$. As a consequence we obtain lower and upper bounds for $c_1(0,\nu,0) \equiv j'_{\nu,1}$, the first positive zero of the $J'_\nu(x)$, which are sharper than previously known ones.