Let, $L = \lim_{x \to 0} \frac{|x|}{\sqrt{x^4 + 4x^2 + 1}}$ then

(A) L < 0 (B) L > 0 (C) L = 0 (D) Limit does not exist

Solution

Since $\sqrt{x^4 + 4x^2 + 1} \geq 1$, $\frac{|x|}{\sqrt{x^4 + 4x^2 + 1}} \leq |x|$

Also, $\frac{|x|}{\sqrt{x^4 + 4x^2 + 1}} \geq 0$

Thus, $0 \leq \frac{|x|}{\sqrt{x^4 + 4x^2 + 1}} \leq |x|$

$\therefore \lim_{x \to 0} 0 \leq \lim_{x \to 0} \frac{|x|}{\sqrt{x^4 + 4x^2 + 1}} \leq \lim_{x \to 0} |x|$

$\therefore 0 \leq L \leq 0$

$\therefore L = 0$

Answer: (C)