$\boxed{1.5}$ Найти предел функции:

$$\lim_{x\to 0}\frac{\sqrt{2}x^2\sin 4x}{(1-\cos 2x)^{\frac{3}{2}}} = (1)$$

$$\lim_{x\to 0}(1-\cos 2x)^{\frac{3}{2}} = (1-\cos 2x)^{\frac{3}{2}}\Big|_{x=0} =$$

$$= (1-\cos(2\cdot 0))^{\frac{3}{2}} = (1-\cos 0)^{\frac{3}{2}} = (1-1)^{\frac{3}{2}} = 0^{\frac{3}{2}} = 0$$

$$\lim_{x\to 0}(\sqrt{2}x^2\sin 4x) = \sqrt{2}x^2\sin 4x\Big|_{x=0} =$$

$$= \sqrt{2}\cdot 0^2\sin(4\cdot 0) = \sqrt{2}\cdot 0^2\cdot\sin 0 = \sqrt{2}\cdot 0\cdot 0 = 0$$

$$(1-\cos 2x)^{\frac{3}{2}} = \{$$

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha = (1-\sin^2\alpha) - \sin^2\alpha = 1 - 2\sin^2\alpha$$

$$\} = (1-(1-2\sin^2 x))^{\frac{3}{2}} = (1-1+2\sin^2 x)^{\frac{3}{2}} = (2\sin^2 x)^{\frac{3}{2}} =$$

$$= 2^{\frac{3}{2}}(\sin x)^{2\cdot\frac{3}{2}} = 2^{\frac{3}{2}}\sin^3 x$$

$$\sin 4x = \sin(2\cdot 2x) = [\sin 2\alpha = 2\sin\alpha\cos\alpha] =$$

$$= 2\sin 2x\cos 2x = 2(2\sin x\cos x)\cos 2x =$$

$$= 4\cos x\cos 2x\sin x$$

$$\frac{\sqrt{2}\,x^2\sin 4x}{(1-\cos 2x)^{\frac{3}{2}}} = \sqrt{2}\,x^2\frac{\sin 4x}{(1-\cos 2x)^{\frac{3}{2}}} =$$

$$= \sqrt{2}x^2\frac{4\cos x\cos 2x\sin x}{2\sqrt{2}\,\sin^3 x} = \frac{4\sqrt{2}}{2\sqrt{2}}x^2\cos x\cos 2x\frac{\sin x}{\sin^3 x} =$$

$$= 2x^2\frac{\cos x\cos 2x}{\sin^2 x} = 2\cos x\cos 2x\frac{x^2}{\sin^2 x} = \{x \neq 0\} =$$

$$= 2\cos x\cos 2x\left(\frac{\sin x}{x}\right)^{-2}$$

$$(1) = \lim_{x\to 0} 2\cos x\cos 2x\left(\frac{\sin x}{x}\right)^{-2} =$$

$$= 2\lim_{x\to 0}(\cos x\cos 2x)\left(\lim_{x\to 0}\frac{\sin x}{x}\right)^{-2} = \Big\{$$

$$\lim_{x\to 0}\frac{\sin x}{x} = 1$$

$$\lim_{x\to 0}(\cos x\cos 2x) = \cos x\cos 2x\Big|_{x=0} = \cos 0\cos(2\cdot 0) = \cos 0\cos 0 = 1\cdot 1 = 1$$

$$\Big\} = 2\cdot 1\cdot 1^{-2} = 2$$

Ответ:

$$\boxed{\lim_{x\to 0}\frac{\sqrt{2}\,x^2\sin 4x}{(1-\cos 2x)^{\frac{3}{2}}} = 2}$$