

A horizontal string transmits a power P if a wave with an amplitude A and an angular frequency ω , is traveling along it. If both the amplitude A and the tension F along the string are doubled, the new power of

transmission is P' , then the ratio of $\frac{P}{P'}$ is

A) $\frac{P}{P'} = 2.$

B) $\frac{P}{P'} = 2\sqrt{2}.$

C) $\frac{P}{P'} = 4.$

D) $\frac{P}{P'} = 4\sqrt{2}.$

$$P = \frac{1}{2} \mu (\omega A)^2 v, \text{ where } v = \sqrt{\frac{F}{\mu}}.$$

So

$$P = \frac{1}{2} \mu (\omega A)^2 \sqrt{\frac{F}{\mu}} = \frac{1}{2} \sqrt{\mu} \omega^2 \sqrt{F} A^2,$$

$$\frac{P'}{p} = \frac{\sqrt{F'} A'^2}{\sqrt{F} A^2} = \frac{\sqrt{2F} (2A)^2}{\sqrt{F} A^2} = 4\sqrt{2}.$$

Answer **D**.

16.08-02 Power of Transmission 2004-4-22