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13-58.

The 2-kg spool *S* fits loosely on the inclined rod for which the coefficient of static friction is $\mu_s = 0.2$. If the spool is located 0.25 m from *A*, determine the minimum constant speed the spool can have so that it does not slip down the rod.

SOLUTION

$$\rho = 0.25 \left(\frac{4}{5}\right) = 0.2 \text{ m}$$

$$\Leftarrow \Sigma F_n = m a_n; \qquad N_s \left(\frac{3}{5}\right) - 0.2 N_s \left(\frac{4}{5}\right) = 2 \left(\frac{v^2}{0.2}\right)$$

$$+\uparrow \Sigma F_b = m a_b; \qquad N_s \left(\frac{4}{5}\right) + 0.2 N_s \left(\frac{3}{5}\right) - 2(9.81) = 0$$

$$N_{s} = 21.3 \text{ N}$$

v = 0.969 m/s



