

عنوان مقاله:

Effect of ventilation air velocities on diesel particulate matter dispersion in underground coal mines

محل انتشار:

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خلاصه مقاله:

This paper presents a detailed account of computational fluid dynamics (CFD) simulations undertaken to investigate the influence of intake (ventilation) air velocities on the flow patterns of diesel particulate matter (DPM) generated by a man-riding vehicle operating in a straight rectangular cross section tunnel in an underground coal mine. The simulation results are validated against an earlier experimental study. At a sampling station 10 m downstream of the vehicle, the DPM concentration was seen to decrease rapidly with increasing intake air velocity. For air velocities of 0.5 m/s, 1 m/s, 2 m/s and 3 m/s, the DPM concentration was estimated to be 233 $\mu\text{g}/\text{m}^3$, 131 $\mu\text{g}/\text{m}^3$, 116 $\mu\text{g}/\text{m}^3$ and 1 $\mu\text{g}/\text{m}^3$ respectively. At 10 m downstream of the vehicle, if the intake air velocity is reduced from a base value of 1.26 m/s by 40% and 60% of the base value, the average DPM concentration increased to 58% and 123% respectively. If the intake air velocity is increased by 58% and 98% of the base case value, the average DPM concentration decreased to 44% and 78% respectively.

کلمات کلیدی:

Coal mines, DPM, Air velocity, CFD, Man-riding vehicle

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