TYPICAL AIRFLOW PATTERNS WITH MULTIPLE CEILING FANS

Aleksandra Lipczynska, Stefano Schiavon, Shuo Liu, Edward Arens

OBJECTIVE & METHODOLOGY

- To investigate the impact of ceiling fans mutual interaction, rotational speed and distance on air speed fields
- To develop typical room airflows patterns for fan manufacturers, designers and researchers to improve the location of fans
- To validate high spatial air speed measurements

→ We did tests for different center-to-center distances between fans (1.3xD, 1.7xD, 2.1xD) and four speed set-points for each fan (turned off – 0, low speed – L, medium speed – M and high speed – H).
→ We compared results with typical air circulation pattern for single-fan room

RESULTS

Air circulation in the single-fan room: cross-view across longest (green) and shortest (blue) distance to the wall (left) and plane view (right)

Air circulation in the double-fan room at the shorter center-to-center distance (1.3xD) – cross view at: A) comparable scenario at medium-/high-speed levels (M-M, H-M and H-H); B) comparable scenario at low-speed level (L-L); C) dominant scenario (M-L and H-L).

Air circulation in the double-fan room at the shorter center-to-center distance (1.7xD) – cross view at: A) comparable scenario at medium-/high-speed levels (M-M, H-M and H-H); B) comparable scenario at low-speed level (L-L); C) dominant scenario (M-L and H-L).

Air circulation in the double-fan room – plan views at the 0.5 m: (A) 1.3xD; (B) 1.7xD and (C) 2.1xD. Comparable scenario refers to cases when performance of both fans is relatively similar, while dominant scenario to cases when fan with higher speed level has a commanding position over the weaker fan.

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