Abstract

This thesis research compares the air dispersion and thermal comfort characteristics of conventional diffuser and fabric-based ductwork systems. Heating, ventilation, and air-conditioning (HVAC) systems in buildings produce and regulate airflow traveling through ductwork. The performance characteristics of conventional ductwork are compared with recent advancements in fabric-based ductwork. Using computational fluid dynamics (CFD) analysis, thermal and air distribution flow patterns are compared between the two types of ductwork and preliminary thermal comfort and efficiency conclusions are drawn. Results of the Air Distribution Performance Index (ADPI) for both ducting systems reflect that, under the given test conditions, the fabric duct system is approximately 23% more comfortable than the traditional diffuser system in terms of air speed flow uniformity into the space, while staying within the Effective Draft Temperature comfort zone of -3 to +2°F.