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Active Flow Control Integrated Diffuser for increased Energy Efficiency in Variable Air Volume Systems HERMANUS VAN DER SCHIJFF, DAVID MENICOVICH, JASON VOLLEN, MICHAEL AMITAY, Rensselaer Polytechnic Institute — An experimental investigation was performed to study the application of flow control on an HVAC diffuser using synthetic jets distributed evenly along the diffuser edges. The study was conducted on 1:3 scale typical office space (150 ft²), which included a simulated scale HVAC system supplied by compressed air. Two different jet momentum coefficients were investigated for two inlet flow rates of 40 and 60 CFM. The flow field was measured using hot wire anemometry and Particle Image Velocimetry. Current Variable Air Volume HVAC systems vary the incoming airflow to adjust to changing temperature conditions in the conditioned space. However, when the air flow rate drops below ideal, air distribution becomes inefficient. This study demonstrates the effectiveness of synthetic jets at controlling the incoming airflow and the distribution in the room, showing ability to affect throw coefficient parameters for different flow rates within the test chamber. The use of such devices has the potential to improve air quality and air distribution in building while simultaneously lowering energy demands of HVAC systems.

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