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Axial Reynolds Stress Budget for Turbulent Swirling and Non-Swirling Jets SARA TOUTIAEI, JONATHAN NAUGHTON, University of Wyoming — The terms of the axial Reynolds stress budget were studied for turbulent swirling and non-swirling jets. Laser Doppler anemometry (LDA) was used for acquiring measurements at locations where the two jets were at similar stages of development. A large number of data (∼50,000 samples) was obtained at each measurement point in order to achieve high accuracy for the third order moments. The mean velocity and Reynolds stress results were consistent with previous studies. Production, convection and turbulent transport terms of Axial Reynolds stress equation were used as a means to investigate the differences in the two jets. Higher production in the swirling jet contributes to the higher Reynolds stress magnitude compared with the non swirling jet. In general, production exhibits higher values compared with the turbulence transport for both jet cases. Near the center of the jet where production has near zero values, turbulence transport has higher magnitudes. The turbulence transport is thus moving turbulence away from where it is largely produced toward the center of the jet. The faster development of turbulence transport term coupled with higher production in the swirling jet is found to be responsible for its faster growth compared to the non-swirling jet.

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