Turbulent transport of passive scalar in magnetohydrodynamic channel flow[1] PRASANTA DEY, OLEG ZIKANOV, University of Michigan - Dearborn — Direct numerical simulations are conducted to analyze transport of a passive scalar in a turbulent flow of an electrically conducting fluid in a channel. Cases of imposed wall-normal, spanwise, and streamwise magnetic field are considered. The magnetic Reynolds and Prandtl numbers are assumed small. The hydrodynamic Reynolds number based on the channel half-width and mean velocity is Re=6000 and the Hartmann number varies from zero to the value slightly below the laminarization threshold. We find that the flow transformation caused by the magnetic field leads to significant changes of the statistical properties of the scalar distribution and of the rate of scalar transport. A particularly important factor is the suppression of turbulent fluctuations of wall-normal velocity in the cases of wall-normal and spanwise magnetic fields.

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