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Scaling of the velocity-scalar cross-correlation spectrum in twodimensional turbulence WOUTER J.T. BOS, BENJAMIN KADOCH, KAI SCHNEIDER, MSNMGP - CNRS & CMI, Universite de Provence, Marseille, France, JEAN-PIERRE BERTOGLIO, LMFA - CNRS, Ecole Centrale de Lyon-UCBL-INSA, Lyon, France — Two-dimensional isotropic turbulence with an imposed uniform scalar gradient is investigated. Dimensional arguments are presented to predict the inertial range scaling of the turbulent scalar flux spectrum both in the inverse cascade range and in the enstrophy cascade range. The predictions are checked by Direct Numerical Simulations. In the inverse cascade range perfect agreement with predictions is observed, while for the forward enstrophy cascade range the results differ from the predictions due to the emergence of coherent vortices. A link between the scalar flux and the Lagrangian particle displacement-velocity correlation, allows to evaluate the Lagrangian timescale needed in Markovian two-point closures of turbulence.

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