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Spectral eddy viscosity and diffusivity in a turbulent shear¹ HYUNG-SUK KANG, CHARLES MENEVEAU, Johns Hopkins University — Experimental measurements were performed of the spectral eddy viscosity and diffusivity in a heated wake flow, using an array of four X-wire and four cold-wire probes. The data were analyzed by applying two-dimensional box-filtering in the streamwise and cross-stream directions and using assumptions of local isotropy. The results show that the spectral eddy viscosity and diffusivity approach zero at large wavenumbers (qualitatively consistent with Leslie & Quarini's classic analysis for graded filters). We find that it also decreases at low wavenumbers approaching the integral scale. To compare the experimental results with EDQNM predictions in more detail, the EDQNM computations are performed using the experimentally obtained spectra. Also, the sensitivity of the EDQNM predictions to eddy-damping parameters and to the flow integral scale is explored. Overall, we find reasonable qualitative agreement between measurements and EDQNM. However, we find that the low- wavenumber decrease of the measurements is not reproduced well by the EDQNM within reasonable ranges of the adjustable parameters. Some discrepancies between our EDQNM calculations and those of Leslie & Quarini are also pointed out.

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