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Turbulence modified by velocity shear in coronal mass ejection sheaths

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Fast coronal mass ejections (CMEs) drive shock waves ahead of them. The turbulent sheath region between the shock and the CME itself contains magnetic field and velocity fluctuations on a broad spectrum of frequencies. In this work we aim to characterise the direction and source of solar wind fluctuations at MHD fluid scales in CME-driven sheaths near Earth. One possible source for these fluctuations is velocity shear, which are common occurrences in CME-driven sheaths. Here we first identify velocity shear as it occurs and then relate that to signatures of new fluctuations being created locally in the sheath. Turbulence parameters such as cross helicity, residual energy, Elsasser ratio, and Alfvén ratio are calculated, and they are correlated against large-scale signatures of velocity shear. Findings indicate a clear association between velocity shear and locally generated fluctuations, as well as a balance in the directionality of these new fluctuations, i.e., they tend to propagate equally towards and away from the Sun. In contrast, most solar wind is typically dominated by anti-sunward fluctuations.