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STADIUS Center for Dynamical Systems, Signal Processing and Data Analytics

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Abstract	A method is proposed for performing speech enhancement using ego-noise references with a microphone array embedded in an unmanned aerial vehicle (UAV). The ego-noise reference signals are captured with microphones located near the UAV's propellers and used in the prior knowledge multichannel Wiener filter (PK-MWF) to obtain the speech correlation matrix estimate. Speech presence probability (SPP) can be estimated for detecting speech activity from an external microphone near the speech source, providing a performance benchmark, or from one of the embedded microphones, assuming a more realistic scenario. Experimental measurements are performed in a semi-anechoic chamber, with a UAV mounted on a stand and a loudspeaker playing a speech signal, while setting three distinct and fixed propeller rotation speeds, resulting in three different signal-to-noise ratios (SNRs). The recordings obtained and made available online are used to compare the proposed method to the use of the standard multichannel Wiener filter (MWF) estimated with and without the propellers' microphones being used in its formulation. Results show that compared to those, the use of PK-MWF achieves higher levels of improvement in speech intelligibility and quality, measured by STOI and PESQ, while the SNR improvement is similar.
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