

Shi, Xinling; Bai, Baodan; Zhang, Yufeng; Ma, Huahong; Chen, Jianhua
Extraction of mean frequency information from doppler blood flow signals using a matching pursuit algorithm. (English) [Zbl 1151.94409](#)
[Signal Process.](#) 88, No. 11, 2720-2730 (2008).

Summary: The intensity-weighted mean frequency (IWMF) waveform of Doppler blood flow signals associates with the instantaneous mean blood velocities and has been found to be very useful to measure volumetric flow and detect arterial stenosis. These applications involving Doppler signals require the accurate estimation of the IWMF over short durations of the signal due to its nonstationarity. The traditional short-time Fourier transform (STFT) method requires stationarity of the signal during a finite window, making it inaccurate to analyze signals having relatively wide bandwidths that change rapidly with time. In order to accurately estimate the Doppler IWMF waveform, even when the temporal flow velocity is rapid (high nonstationarity), we extract the Doppler IWMF waveform from the time-frequency distribution estimated using the matching pursuit (MP) with stochastic time-frequency dictionaries in the present study. Because of its local adaptivity to transient structures, the MP algorithm provides a remarkably compact time-frequency description and high time-frequency resolution of a signal. A comparative evaluation has been made between the classic (STFT-based) and the MP-based algorithms. Experimental results indicate that the Doppler IWMF waveform estimated using the MP with stochastic dictionaries is more accurate than that based on the STFT.

MSC:

[94A12](#) Signal theory (characterization, reconstruction, filtering, etc.)

Keywords:

[Doppler ultrasound](#); [blood flow](#); [intensity-weighted mean frequency](#); [matching pursuit](#)

Software:

[WavBox 4](#)

Full Text: [DOI](#)