Multichannel Seismocardiography

A Novel Method for Investigating the Seismocardiogram

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Multichannel seismocardiography: A novel method for investigating the seismocardiogram

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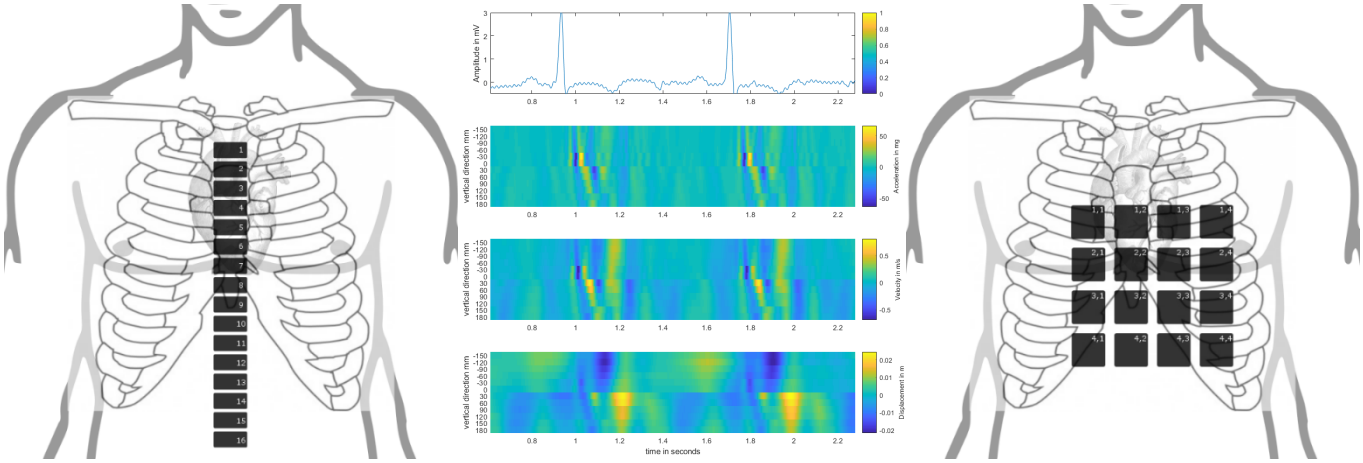
Seismocardiography (SCG) have long been proposed as the mechanical counterpart of electrocardiography. However, while the different components of the electrocardiography have been accounted for the SCG seems more complex. Methods that included echocardiography have been used to study the relation between the heart activity and the SCG components. However SCG seems to be a composition of many waves that propagates across the chest, and then is acquired at a single site.

We hypothesis that by investigating chest vibrations synchronously from multiple sites we can investigate how waves propagates across the chest. By comparing the waves propagation velocity, direction, epicenters, and timing, we hope to better explain how the SCG from a single site is composed of these waves.

A system with up to 16 3-axis highly sensitive accelerometers where developed. This multichannel seismocardiogram (mSCG) could synchronize the measurements of 16 SCG along with a 3-lead ECG. To investigate the chest waves two sensor formations have been proposed. The transverse formation reveals a distinct wave that travels downward from the xiphoid process. The second formation is in a 4 by 4 grid on the chest, which show that the local maximum of the SCG different waves have different centers.



We have shown through this method that information about the composition of a single site SCG can be better explained by measuring on multiple sites and by investigating the features of the individual waves. Further studies with this method will be conducted, that will involve echocardiography, to assist in describing the SCG signal composition of chest surface waves.