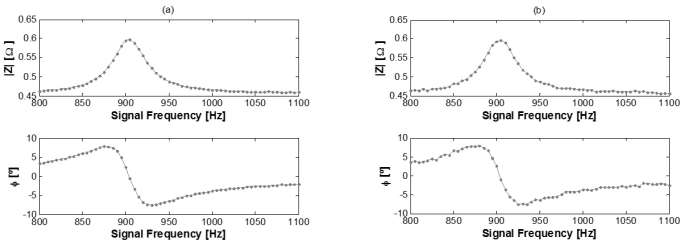
06SP064 Impedance Estimation of a Vibrating Wire Viscosity Sensor Using Multi-Harmonic Signals

José Santos[42], **Pedro M. Ramos**[43]

-This paper presents a method to estimate the impedance response of a vibrating wire viscosity sensor. The method is based on the application of a multi-harmonic signal at the terminals of the sensor. The signal is composed by the harmonics correspondent to the frequencies at which one wants to obtain the impedance of the sensor. The impedance is determined using least-squares (LS) multi-harmonic fitting algorithms to estimate the amplitudes and phases of the harmonics of the impedance current and voltage. The measurement and estimation procedure is performed by a dedicated developed measurement system. It includes a digital signal processor (DSP) to perform all the calculations, programmable gain instrumentation amplifiers (PGIA) and analog to digital converters (ADC) to amplify and acquire the signals across the sensor and a reference impedance used to limit and sample the current flowing through the wire of the sensor. The system is connected via USB to a personal computer (PC) where the measurement results can be stored, interpreted and further processed.

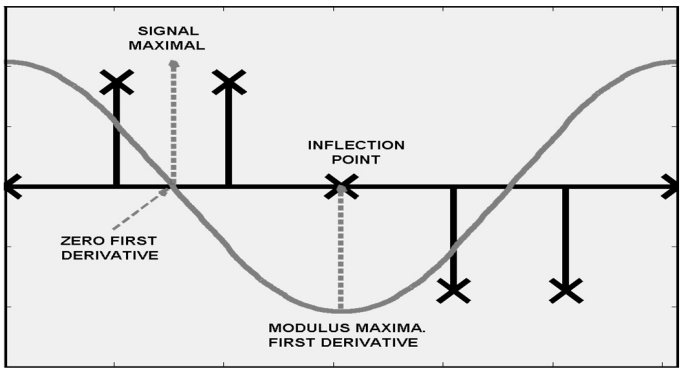


Sensor's impedance response: (a) using frequency sweep; (b) using multi-harmonic signal.

06SP076 Operators to calculate the derivative of digital signals

Lluís Ferrer-Arnau[44], Juan Mon Gonzalez[44], Vicenç Parisis-Baradad[45]

Digital images and digital signals have a lot of advantages: facility in storage, compression, easy to operate numerically, but have disadvantages too. The principal is that operations relative to differential calculus are not well defined, like derivatives. In this work is presented a way to solve this. First digital signal is converted into a continuous signal using polynomial spline interpolation, and then, the derivatives are calculated like the derivatives of the polynomial where the sample is.



The continuous representation of the first derivative of a discrete signal.