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Low frequency implementation of the full Kramers-Kronig relationships for the description of dispersion and attenuation of acoustical waves in porous media

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It is well known that the causality principle which applies during the acoustic propagation of a wave packet inside any material should be described by the universal Kramers-Kronig relationships, enabling to formally link dispersion to attenuation curves. The application of the K-K formalism to porous networks has been studied lately, but unfortunately, the metrology of dispersion features at very low frequency is intricate. The use of parametric arrays of non-linear acoustics enables to get at the same time, some precise information on dispersion and absorption on various porous media, for instance in the frame of the "equivalent fluid" model. In the present work, we describe some very recent findings obtained along these ideas for a truly relevant application of the full Kramers-Kronig formalism in various fibrous materials. We have checked numerical predictions of the absorption versus frequency computed from the dispersion curves with the K-K modelling, as well as confrontation of these numerical predictions with experimental data on absorption obtained with various set-ups, on different fibrous materials.