Form factors in $B \to f_0(980)$ and $D \to f_0(980)$ transitions from dispersion relations

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The understanding of scalar mesons is a challenge both in theoretical and experimental physics. Scalar mesons described within the Standard Model formalism are still controversial and their identification remains a difficult experimental task. Viewing the $f_0(980)$ as a quark-antiquark state, we have performed a calculation of transition form factors between pseudo-scalar and scalar mesons in weak decays, namely the B or D and $f_0(980)$ mesons respectively. The calculations are done using dispersion relations within a relativistic quark model. In this dispersion approach [1], transition amplitudes are given by relativistic spectral integrals (over the corresponding mass variables) in terms of spectral densities, computed from triangular Feynman diagrams, and of appropriate meson wave functions. The phenomenological wave function of the $f_0(980)$ meson is constrained by several branching ratios of D decays involving a final $f_0(980)$ state. In particular, these form factors are obtained in the full q^2 range, both space-like and time-like, for weak decays. We will present a complete phenomenological analysis of the $f_0(980)$ scalar meson as well as the form factors $F_+(q^2)$ and $F_-(q^2)$ describing the transition between $B(D)$ and $f_0(980)$ mesons. Applications to $B \to \pi\pi K$ and $B \to K\bar{K}K$ decays will also be discussed.

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