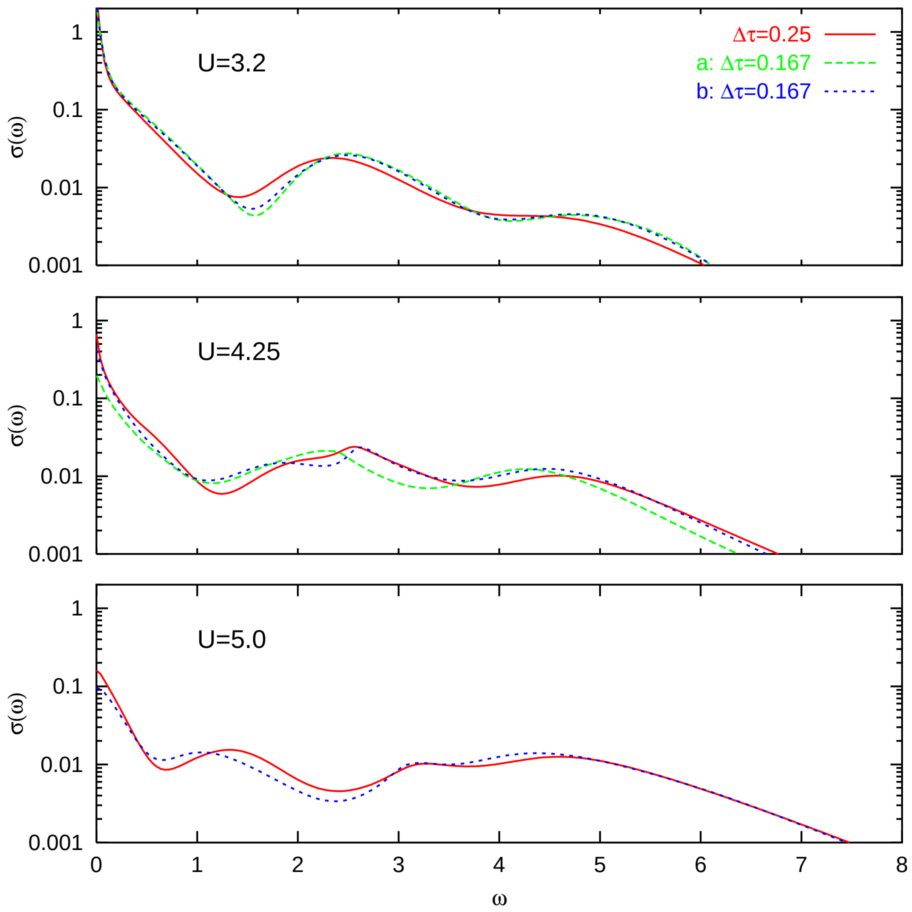

Figure 5.17: Optical conductivity $\sigma(\omega)$ for $La_{1-x}Sr_xTiO_3$ using the $d = \infty$ estimate for $\tilde{\rho}(\epsilon)$ depicted in Fig. 5.15 b. The variations "a" and "b" of the MEM scheme are explained in the discussion of Fig. 5.12.

real part of the optical conductivity $\sigma(\omega)$ for $U = 3.2$, $U = 4.25$, and $U = 5.0$ (thick lines) at $T = 0.1$ (using set "b" for $\Delta\tau = 0.167$) in comparison with results that the same formalism yields for a constant squared Fermi velocity $\langle |\boldsymbol{v_k}|^2 \rangle$. The inclusion of a nonconstant $\langle |\boldsymbol{v_k}|^2 \rangle(\epsilon)$ clearly impacts the total spectral weight and its distribution for all choices of the interaction. In general, features become more pronounced. Quantitatively, this effect becomes less important for strong interactions: at $U = 5$, the relative error associated with a neglect of the energy dependence of $\langle |\boldsymbol{v_k}|^2 \rangle(\epsilon)$ never exceeds about 20%. From this fact we conclude that also a full finite-dimensional LDA evaluation of $\tilde{\rho}(\epsilon)$ or, equivalently, of $\langle |\boldsymbol{v_k}|^2 \rangle(\epsilon)$ would not lead to dramatic changes compared to our estimate. Therefore, we regard our result for $U = 5$ as a reasonable LDA+DMFT(QMC) estimate for the $3d$ t_{2g} contribution to the optical conductivity of $La_{1-x}Sr_xTiO_3$ with doping $x = 0.06$. On the other hand, much more reliable results for all observables discussed in this section could be expected when using a state-of-the-art QMC program that does not suffer from large $\Delta\tau$ errors due to an inefficient implementation of the Fourier-transformation