Consider $G_<(t,\varphi)$ and auxiliary function $G_<^{\varphi=0}(t,\varphi)$.

We would like to exclude the following contributions to $G_<(t,\varphi)$:

1) Contributions due to a time-shift;
$G_<^{(0)}(\omega t-\varphi)$

2) Contibutions that are not $G_<^{(0)}(\omega t-\varphi)$, but are only because of the pulse envelope.

1. Contibution due to time shift can be easily exluded $\{\varphi \equiv \tau\omega\}$:

$$\frac{\partial G_<^{(0)}}{\partial \tau} = -\frac{\partial G_<^{(0)}}{\partial t},$$ thus we should do the following operation with $G_<(t,\varphi)$:

$$\frac{\partial G_<(t,\varphi)}{\partial \tau} + \frac{\partial G_<(t,\varphi)}{\partial t} = G_<^{(1)}(t,\varphi).$$

2. $G_<^{(1)}(t,\varphi)$ still contains the "linear" contibutions, (i.e. contibutions that we want to exclude), because of the envelope.

Thus, to exclude them as well we take the difference $G_<^{(1)}(t,\varphi) - G_<^{\varphi=0\,(1)}(t,\varphi)$, where
$$G_<^{\varphi=0\,(1)}(t,\varphi) \equiv \frac{\partial G_<^{\varphi=0}}{\partial \tau} + \frac{\partial G_<^{\varphi=0}}{\partial t}$$

$G_<^{\varphi=0(1)}(t,\varphi)$ contains only envelope effects.

Thus, we have the following algorithm:

We calculate

1) $G_<^{(1)}(t,\varphi) = \frac{\partial G_<(t,\varphi)}{\partial \tau} + \frac{\partial G_<(t,\varphi)}{\partial t}$

2) $G_<^{\varphi=0(1)}(t,\varphi) = \frac{\partial G_<^{\varphi=0}(t,\varphi)}{\partial \tau} + \frac{\partial G_<^{\varphi=0}(t,\varphi)}{\partial t}$

3) $G_<^{(2)}(t,\varphi) \equiv G_<^{(1)}(t,\varphi) - G_<^{\varphi=0(1)}(t,\varphi)$.

4) $G_<^{(2)}(t,\varphi) \xrightarrow{2D\ FFT} G_<^{(2)}(\omega_1,\omega_2)$

Note that differentiating over t we exclude the time-independent background, and if it also does not depend on τ (or φ), than it will completely vanish from $G_<^{(1)}(t,\varphi)$.

~~The~~ We can also try to use different axiliary functions, although the effect should be the same. May be using different axiliary functions and averaging could reduce the "reconstruction error"!