Fig. 1: Performance comparison between WL and SL estimation through the measures $I$ (a) and $L$ (b) for a normal phase (solid line), a uniform phase (dashed line), and a Laplace phase (bold solid line).

A performance measure which helps in the interpretation is

$$L = \frac{|c_x(t, s)|}{|r_x(t, s)|}$$

which, for this example, takes the value $L = |E[e^{2i\theta}]|$. Fig. 1(b) shows the index $L$ as a function of $\sigma$ for the three probabilistic distributions considered for $\theta$. On the one hand, as $\sigma$ tends toward zero then the index $L$ tends to one since in that limit the observation process becomes a real signal\(^4\). On the other hand, when $\sigma$ increases then $L$ tends toward zero since $x(t)$ becomes a proper signal. The faster convergence to zero in the normal case and the slower one for the Laplace distribution are also observed.

B. Example 2

We study a generalization of the classical communication example addressed in [28] and [29]. Assume that a real waveform $s_1(t)$ is transmitted over a channel that rotates it by a standard normal phase $\theta_1$

\(^4\)Notice that the complex nature of $x(t)$ in (8) stems from the term $e^{i\theta}$. Hence, as $\sigma \to 0$ then the variance of $\theta$ vanishes and it becomes a degenerate random variable which only takes the value 0 with probability 1.