Signal domain

Spectral domain

$g(x) = \cos(2\pi fx),\ f = 1.0$
Sampled
CFT
DFT after reorg. & sca.
(a)

$g(x) = \cos(2\pi fx),\ f = 1.0 - 0.03125$
Sampled
CFT
DFT after reorg. & sca.
$\text{env}_1(x) = \pm\cos(2\pi\varepsilon x),\ \varepsilon = 0.03125$
$\text{env}_2(x) = \pm\cos(2\pi\varepsilon[x-4]),\ \varepsilon = 0.03125$
$\text{env}_3(x) = \pm\cos(2\pi\varepsilon[x-8]),\ \varepsilon = 0.03125$
$\text{env}_4(x) = \pm\cos(2\pi\varepsilon[x-12]),\ \varepsilon = 0.03125$
(b)

$g(x) = \cos(2\pi fx),\ f = 1.0 - 0.0625$
Sampled
CFT
DFT after reorg. & sca.
$\text{env}_1(x) = \pm\cos(2\pi\varepsilon x),\ \varepsilon = 0.0625$
$\text{env}_2(x) = \pm\cos(2\pi\varepsilon[x-2]),\ \varepsilon = 0.0625$
$\text{env}_3(x) = \pm\cos(2\pi\varepsilon[x-4]),\ \varepsilon = 0.0625$
$\text{env}_4(x) = \pm\cos(2\pi\varepsilon[x-6]),\ \varepsilon = 0.0625$
(c)

$g(x) = \cos(2\pi fx),\ f = 1.0 - 0.125$
Sampled
CFT
DFT after reorg. & sca.
$\text{env}_1(x) = \pm\cos(2\pi\varepsilon x),\ \varepsilon = 0.125$
$\text{env}_2(x) = \pm\cos(2\pi\varepsilon[x-1]),\ \varepsilon = 0.125$
$\text{env}_3(x) = \pm\cos(2\pi\varepsilon[x-2]),\ \varepsilon = 0.125$
$\text{env}_4(x) = \pm\cos(2\pi\varepsilon[x-3]),\ \varepsilon = 0.125$
(d)

$g(x) = \cos(2\pi fx),\ f = 1.0 - 0.25$
Sampled
CFT
DFT after reorg. & sca.
$\text{env}_1(x) = \pm\cos(2\pi\varepsilon x),\ \varepsilon = 0.25$
$\text{env}_2(x) = \pm\cos(2\pi\varepsilon[x-0.5]),\ \varepsilon = 0.25$
$\text{env}_3(x) = \pm\cos(2\pi\varepsilon[x-1]),\ \varepsilon = 0.25$
$\text{env}_4(x) = \pm\cos(2\pi\varepsilon[x-1.5]),\ \varepsilon = 0.25$
(e)

Figure **cosfreq4** from the DFT Demonstration Kit

Accompanying the book: *Mastering the Discrete Fourier*

Transform in One, Two or Several Dimensions: Pitfalls and Artifacts

by I. Amidror, published by Springer, 2013.