

## Instructions for the 2D WT-PDFs Command

The command,

```
[Sig_nf, Sig_fn, Sig_nn, Sig_ff,  
La_n, La_f]= TwoDmatrx(t1, t2, dt)
```

takes two conjugated column vectors of  $N$  random times (or any other kind of non-negative observations)  $t_{on}$  and  $t_{off}$ , and a time increment,  $dt$ , and returns as an output the eigenvalues  $\{\lambda_{on}, \lambda_{off}\}$  and the matrices of coefficients,  $\{\sigma_{x,y}\}_{x,y=on,off}$ , in the exponential expansions of all four two-dimensional WT-PDFs,

$$\phi_{x,y}(t_1, t_2) = \sum_{i=1}^{L_x} \sum_{j=1}^{L_y} \sigma_{x,y,ij} e^{-\lambda_{x,i} t_1 - \lambda_{y,j} t_2}; \quad x, y = on, off.$$

The subroutine builds special WT-PDFs from the data, and uses them in numerical algorithms to estimate the matrices  $\{\sigma_{x,y}\}_{x,y=on,off}$ . The methods used in this routine are the Padé approximation method, likelihood technique, and optimization subroutines. See [1] for further information.

At a first step, the command is designed to work in Matlab environment, and uses the optimization toolbox in Matlab. In the final form, the command will be used through a web-interface that analyzes the signal for web-users. Subscription will be needed for using the web-interface.

### **Reference:**

[1] O. Flomenbom, and R. J. Silbey, *Toolbox for analyzing finite two-state trajectories*, Phys. Rev. E **78**, 066105 (2008).