Explanation for the MATLAB scripts

The MATLAB scripts in this repository were provided by Yoshio Komori (komori@phys.kyutech.ac.jp) to give numerical results in a manuscript, "Formulae for mixed moments of Wiener processes and a stochastic area integral". Anyone is allowed to use, copy, modify and test them for non-commercial purposes without fee. The scripts are provided for use as is without warranty of any kind.

The scripts can solve the following noncommutative test SDE:

$$\mathrm{d}\boldsymbol{y}(t) = F_0\boldsymbol{y}(t)\mathrm{d}t + F_1\boldsymbol{y}(t)\mathrm{d}W_1(t) + F_2\boldsymbol{y}(t)\mathrm{d}W_2(t), \quad \boldsymbol{y}(0) = \boldsymbol{y}_0,$$

where

$$F_0 = \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix}, \qquad F_1 = \begin{bmatrix} \sigma_1 & 0 \\ 0 & -\sigma_1 \end{bmatrix}, \qquad F_2 = \begin{bmatrix} 0 & \sigma_2 \\ \sigma_2 & 0 \end{bmatrix}$$

for nonzero real numbers λ, σ_1 and σ_2.

The scripts "main_simul_by_MagEuler.m" and "main_simul_by_MagMilstein.m" give approximate solutions in files by the Magnus-type Euler method and the Magnus-type Milstein method, respectively, whereas "main_simul_by_Milstein.m" gives a reference solution in a file. The script "output_example.m" gives errors of the methods by reading the files. The others are called from these main script files.

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