

SimuBloch v0.1 User Guide

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1 Introduction

The simulator *SimuBloch* is made for a fast simulation of signal sequences based on Bloch equation, which can be run directly from VIP Portal: <http://vip.creatis.insa-lyon.fr>. The current version is v0.1.

2 Description

SimuBloch allows to simulate the **Spin Echo** sequence using the following function:

$$S = M_0(1 - \exp(-TR/T_1)) \exp(-TE/T_2) \quad (1)$$

The simulator is given in Fig. 1.

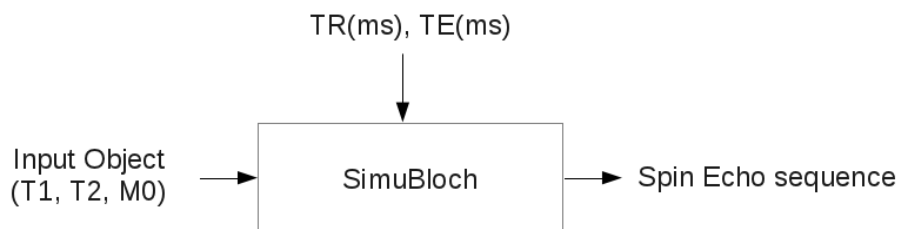


Figure 1: Construction of the Spin Echo sequence with the simulator *SimuBloch*.

3 Inputs & Output

- Input image files (Mandatory)
 - T_1 : Longitudinal (or spin-lattice) relaxation time (ms).
 - T_2 : Transverse (or spin-spin) relaxation time (ms).
 - M_0 : Equilibrium magnetization, which is proportional to proton density ρ .

The dimensions and the sizes of the input images should be equal. The supported image formats are given in the ITK library. The dimension can be 1D, 2D or 3D. The simulator was under the test with input images of 3D nifti format.

- Input parameters
 - TR : Repetition time (ms). The value should be ≥ 0 . The default value is 200(ms).
 - TE : Echo time (ms). The value should be ≥ 0 . The default value is 50(ms).

If the parameters are not set as input, the simulator uses the default values to calculate the sequence.

- Output image file (Mandatory)
 - S : Spin Echo sequence. The supported image formats are given in the ITK library. The dimension can be 1D, 2D or 3D. The simulator was under the test with output image of 3D nifti format.

4 Usages

From a 3D virtual object with parameters T_1 , T_2 and M_0 , we can compute the Spin Echo sequence using the simulator for 3 basic MRI scans.

- T_1 -weighted: Short TR , long TE .
For example, $TR = 500ms$, $TE = 8.4ms$.
- T_2 -weighted: Long TR , long TE .
For example, $TR = 6530ms$, $TE = 84ms$.
- PD -weighted: Long TR , short TE .
For example, $TR = 6530ms$, $TE = 9.4ms$.
- The sample data can be found in the package *SimuBloch* v0.1.

5 Contact

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