



Breast cancer response model

Mathematical model

$$\frac{\partial N(\bar{x}, t)}{\partial t} = \nabla \cdot (D \nabla N(\bar{x}, t)) + k(\bar{x}) \left(1 - \frac{N(\bar{x}, t)}{\theta}\right) N(\bar{x}, t)$$

$$D = D_0 e^{-\gamma \sigma_{vm}(\bar{x}, t)}$$

$$\nabla \cdot \sigma + \lambda \nabla N(\bar{x}, t) = 0$$

Code summary

Calibration

Inputs:

- patient data
- scanning schedule

Outputs:

- calibrated parameters

Functions:

- NtcFD3DmechOPUT1to2
- Boundaries3DUT
- Diffy3D
- NtcFDmech3DUTLogisticOnly
- forwardsolveLogisticOnly
- ThreeDmech_opt_solver_bcg
- ThreeDmeq_matrix_builder_opt
- ThreeDstress_calc
- CalcCCC

Simulation

Inputs:

- patient data
- scanning schedule
- calibrated parameters

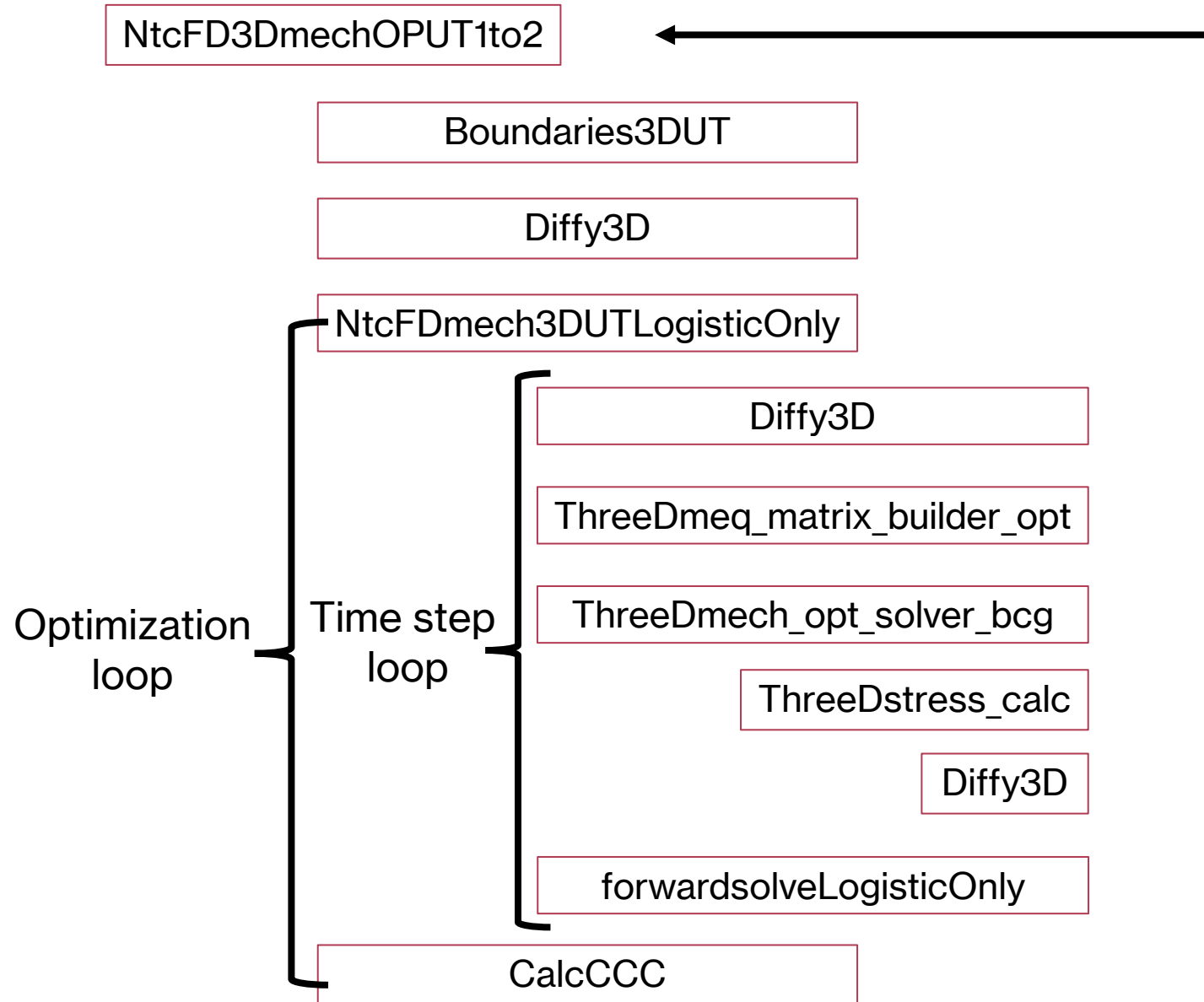
Outputs:

- 3D patient-specific prediction

Functions:

- ModelRunFDMech3DUTLogisticOnly
- Boundaries3DUT
- Diffy3D
- NtcFDmech3DUTLogisticOnly
- forwardsolveLogisticOnly
- ThreeDmech_opt_solver_bcg
- ThreeDmeq_matrix_builder_opt
- ThreeDstress_calc
- DiceAndCC
- CalcCCC
- regionprops3

Workflow schematic: calibration



Required data files:

- testpatient.txt
- BreastMask_testpatient.mat
- NativeX_testpatient.mat
- NativeY_testpatient.mat
- NTC1_testpatient.mat
- NTC2_testpatient.mat
- Tissues1_testpatient.mat
- Tissues2_testpatient.mat

Workflow schematic: simulation

