



# Breast cancer response model

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# 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
- ccc\_barnes2

## Simulation

### Inputs:

- patient data
- scanning schedule
- calibrated parameters

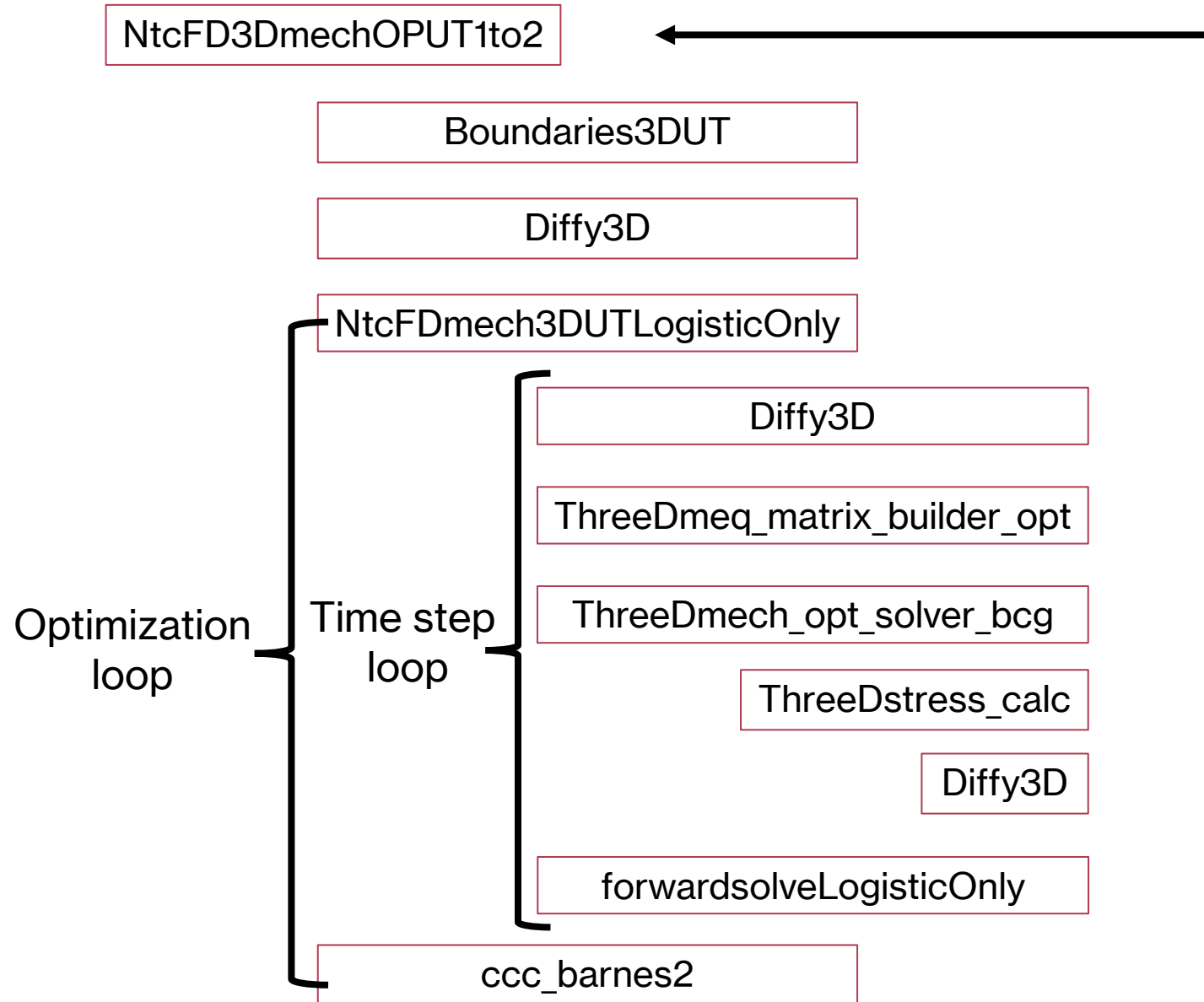
### Outputs:

- 3D patient-specific prediction

### Functions:

- ModelRunFDMech3DUTLogisticOnly
- Boundaries3DUT
- Diffy3D
- NtcFDmech3DUTLogisticOnly
- forwardsolveLogisticOnly
- ThreeDmech\_opt\_solver\_bcg
- ThreeDmeq\_matrix\_builder\_opt
- ThreeDstress\_calc
- DiceAndCC
- ccc\_barnes2
- 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

