Epigenetic Integrity- Simulation framework User Manual

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1 Introduction

This user manual gives a brief introduction to the software framework tool used to simulate and obtain results in the Epigenomic Integrity project- a collaboration between the laboratory of Sophie Polo (Paris 7) and David Holcman (ENS). The construction of the simulation framework tool meant to give answers and insights into the process of epigenomic memory retention and correction post UV damage in chromatin. The simulation framework is constructed using toolboxes developed by Ofir Shukron (ENS) and is a wrapper for core functions and classes used in simulating polymer dynamics in various environments and conditions.

All tools and functions were written in MATLAB 2015a. Several functions were translated into .mex format to speed up running. The code can be pulled or forked from the Git repository of the project at:
https://github.com/ofirENS/EpigenomeIntegrity.git.

2 Getting started

Before you can start using the framework, several codes must be added to the core project to resolve dependencies.

Open MATLAB and set the working path by navigating to the EpigeneticIntegrity Code folder. Run InitEnv.m to set the environment

2.1   Code Dependencies

The *Utils* folder must be added to the project. The *Utils* folder must be external to the Code folder. Get the *Utils* at:

https://github.com/ofirENS/Utils.git

If you wish to change the location of the Utils folder, make sure the path to include Utils in InitEnv.m points to its new location. The Utils folder contains general codes and classes and in addition classes needed for the activation of forces acting on the polymer and in the domain.

The PolymerChainDynamics folder must be added to the project. The folder itself must be external to the Code Folder. Get the PolymerChainDynamics at:

https://github.com/ofirENS/PolymerChainDynamics.git

If you wish to change the location of the PolymerChainDynamics folder, make sure the path to include PolymerChainDynamics in InitEnv.m points to its new location. The PolymerChainDynamics folder contains classes to control the polymer itself and the domain

3   Code Structure

3.1   Main Classes

The work pipeline relies on 4 main classes, all of which are in the EpigenetricIntegrity Code folder.

1. BeamDamageParams.m - a collection of framework parameters

2. BeamDamageSimulation.m - the simulation class

3. BeamDamageResultsAnalysis.m - a class to analyze results of simulations

4. BeamDamageSimulationViewer.m - an off-line graphical viewer

A script is provided to run the first 3 classes in the right order, scrRunBeamDamageSimulation.m

4   Hello World

After you have set the environment and resolved code dependencies, follow the next steps to run a one time full simulations

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