This document provides a brief introduction to the proposed model, including the structure of the code, how to run the model, and some instructions for code compiling. We refer the reader to Lopez Dubon and Lanzoni [2019] and Zhao et al. [2021] for the primary governing equations and numerical approach.

1. Code Structure

This file provides a MATLAB code for simulating long-term evolution of meandering river considering the effect of intermittent bank collapse.

The entrance (or called main program) of the meander migration model is **Main.m** file. In **Main.m**, we provide a lot of annotations to introduce each function and show the code structure. Some important functions are summarized as follows:

Pre_Flags_And_Mex_Fortran.m
Set methods for bank erosion (e.g., parameterized collapse or only flow erosion)

Pre_Initial_Parameters_and_Read_Data.m
Read data from ‘input’ file

ERO_DEP_COLLAPSE.m
Proposed functions to calculate bank collapse

Geometry5.m
Update river bank line

Save_XY_Parameters.m
Output data such as bank line, erosion rate, and collapse distance. The output file is a binary file, and can be found in:
Output\Test1_Outputs\Banks_Test1

Read_Output.m
Read output binary file

Floodplain_Parameters.m
Consider floodplain heterogeneity, not tested

Oxbow_Record_And_Set_Collapse_Variables.m
Record cut-off events

2. Run the Model

We provide a simple function **Bank_Geometry.m** to generate an initial sinuous

configuration. The output binary file can be directly read by the **Main.m** file.

Values for morphodynamic and geotechnical parameters can be set in Input\ **Test1_Param.dat** and
SOIL PARAMETERS.dat.

Before running the model, please carefully set FLAG in **Pre_Flags_And_Mex_Fortran.m** file. For example, if **FLAG_BANK** is set to 7, the model will consider the effect of bank collapse. The simulation time can be set by N year in **Pre_Initial_Parameters_and_Read_Data.m** file. When first run the model, please ADD 'parpool('Threads')' in command line.

After running a simulation, we also provide an example of how to read the data and plot a figure. The reader can use **After_Simulation_Bank_Line_Single.m** to show bank line evolution of each simulation.

Reference:

Lopez Dubon, S., and S. Lanzoni (2019), Meandering Evolution and Width Variations: A Physics-Statistics-Based Modeling Approach, Water Resources Research, 55, 1-19.

Zhao, K., Lanzoni, S., Gong, Z. and Coco, G., 2021. A numerical model of bank collapse and river meandering. Geophysical Research Letters, 48(12), p.e2021GL093516.