**Version 1.0**

This is the original version, used in Oakley and Fisher (2015). Since publication, some errors have been found and corrected, mostly concerning the propagation of uncertainties. None substantially changes the results of that paper, but it is recommended to use the latest version of the program (currently v. 1.2) in all future work.

**Version 1.1**

Things fixed:

1. Probability was calculated as exp(p) = -sum(R2/(2σ2)), where R is the error in the distance from a restored point to the expected line. This ignores the coefficient in the normal distribution probability density function, since that will typically cancel out when comparing two probabilities in a Monte Carlo simulation. However, due to the propagation of uncertainties through restoration, this factor cannot be cancelled out. Thus, this was changed to exp(p) = -(sum(R2/(2σ2))+log(σ)). The factor of 1/sqrt(2π) continues to be canceled out.
2. In calculating the uncertainty in the distance from a point to a line, σx and σ­­­y were improperly used in place of σx2 and σ­­­y2. This was fixed.
3. For the fault with a bend in it model, in the case that the initial tip position is forced to be at the bend, the bend position from the previous model was incorrectly used instead of that from the current model. This was fixed.

**Version 1.2**

Things fixed:

1. In transforming the uncertainty in the position of a point from the trishear coordinate system to the cross section coordinate system, an incorrect rotation equation was used. This was fixed in the course of adding code that considers the covariance matrix for uncertainty in (x,y).

Things added:

1. When propagating uncertainty in (x,y) of a point through trishear deformation, the covariance in the uncertainty of the two coordinates is now considered.
2. Growth strata can now be used to help fit a model, with the slip necessary to restore each growth bed being an additional parameter.
3. Marine terraces can now be used as well. The slip necessary to restore each terrace is an additional parameter.
4. A model for fault parallel flow on a propagating, circular listric fault has been added.
5. A model for parallel fault propagation folding has been added.
6. Restored bed elevations and dips can now be fit for as additional model parameters.

**Version 1.2.1**

This version fixes a few bugs in the things that were newly added in version 1.2.

Things fixed:

1. I fixed an error in the parallel fault propagation fold model, in which data were not properly reflected during a transformation of coordinate systems.
2. I fixed an issue in which the extra parameters for terraces and growth strata were added before the number of parameters was calculated.
3. I fixed an error where only 1 was added to the number of parameters when fitting for bed elevations, regardless of the number of beds.
4. I fixed an error in which one too many parameter values were being read for growth strata, terrace beds, or restored bed elevations.
5. I fixed a case where if fitting for the pre-folding dip of beds, the dip was converted to radians where it shouldn’t have been. I also fixed an error in which the wrong value was sometimes read in for this dip, and a case in which (if fitting for each bed separately), did wasn’t converted to slope where it should have been.
6. I fixed an error in which covariance terms for uncertainty in marine terrace points were being improperly squared. I also fixed an error in which off-diagonal terms of the covariance matrix weren’t properly set to 0 when they should have been.
7. I fixed an error in which the uncertainty in bed points was used instead of that in terrace points in the fault with a bend in it model.
8. I fixed an error in which the program would sometimes crash on reading the parameters file.

**Version 1.2.2**

This version implements two quick bug fixes.

Things fixed:

1. I fixed a bug in the fault with a bend in it model that prevented points in the hanging wall from moving into the trishear zone if the fault tip is below the bend.
2. The previous code for calculating RMS error implicitly assumed that beds all have the same number of points in them. I changed it so that this is no longer the case and beds can be any number of points. The RMS is the RMS error of all points, irrespective of the number in each bed.

**Version 2**

This version is a major revision that implements a number of new features as well as fixing some bugs.

Things fixed:

1. I fixed an error in which the slopes of marine terraces were not read in properly when terraces are used as a data type.
2. For the APT algorithm, if the initial model is specified, I added a prompt to ask for the number of model parameters. This overcomes a problem that can occur with the program not knowing the correct total number of parameters at the time the initial model is asked for. Note that this problem can still occur in other Markov chain Monte Carlo methods, where it has not yet been fixed.
3. I fixed a bug in the treatment of errors for marine terrace points, which occurred if errors were not propagated through the cross section restoration and caused the entire array of uncertainties for all terraces to be used where just the uncertainty for a single terrace should be used.
4. In the parallel fault-propagation fold model, I added R0 (ratio of slip over the two fault segments) terms in calculating fault bend and fault tip position, which were previously missing.
5. In the parallel fault-propagation fold model, I increased the precision to which the angles γ, γ1, and γ\*are calculated, due to errors caused by insufficiently precise γ values.
6. In the parallel fault-propagation fold model, I fixed multiple errors that incorrectly prevented points from moving between the crest, forelimb, backlimb, and flat regions or caused movement into the wrong domain in some cases. I also instituted checks to prevent points from oscillating back and forth between two domains due to rounding errors.
7. In the fault with a bend model, I fixed an error in which the covariance matrix for uncertainties in the position of a point was not properly rotated when the fault tip moved from one segment into the other.
8. I fixed an error for growth strata in the detachment and listric fault models, in which the counter that keeps track of which growth bed is being restored was not properly initialized to 1 at the start of each run.

Things added:

1. A multi-bend trishear algorithm was added to allow faults consisting of an arbitrary number of segments and fault bends to be modeled. This also allows P/S and phi to change during fold growth if desired. It includes options for backlimb deformation by fault-parallel flow, fault-bend folding, and inclined simple shear.
2. I added an option to test that beds have been restored in the correct stratigraphic order.
3. For the s = 1 case, displacements in the trishear zone are now calculated by a semi-analytic method that is much faster than the original incremental method. This applies to all trishear fault models except the circular listric fault.
4. For the Adaptive Parallel Tempering (APT) algorithm, I added the option to save models only at some specified interval rather than save every model.
5. I added an option to restored beds to a multi-segment restored geometry rather than a straight line.
6. I added the option for different x and y uncertainties in bed data points.
7. I added an option to fit groups of beds all to the same restored-state dip, with multiple groups able to be defined.
8. I added an option to have a different uncertainty for each bed.