Review 1:

Thank you for this precious suggestion! We will add a subsection on the generalizability and scalability of the proposed method.

Review 2:

1) Switches detection of a hybrid system can be very hard, especially when the system is complicated. Considering that mode switches are directly reflected on the abrupt change of system dynamics, fitting models into changepoints can help estimate the properties of guard conditions. We assume the guard conditions to be linear so that the process of extracting multiple guard conditions from collected changepoints can be simplified. For the changepoint detection, since there are already a lot of works [1,2] and this topic is out of our research scope, we choose to use presegmented traces in our framework. (

2) The parameter $A\_k$ in equ.2 can be easily solved by linear regression, but it may fail to cluster traces segment based on the similarity be between the $A\_k$s of each trace segment, since the optimal $A\_k$ may vary for trace segments having the same dynamics.

3) Instead of clustering trace segments based on the optimal $A\_k$, we choose to find the solution space of each trace segment under an error tolerance and cluster the trace segments based on the existence of the intersection of their $A\_k$ solution spaces. The equation below equ. 2 describes the solution space. The LMI is a good choice to construct such solution space and find their intersection.

[1] Keogh, Eamonn, et al. "An online algorithm for segmenting time series." Data Mining, 2001. ICDM 2001, Proceedings IEEE International Conference on. IEEE, 2001.

[2] Fu, Tak-chung. "A review on time series data mining." Engineering Applications of Artificial Intelligence 24.1 (2011): 164-181.

Review 3:

1) According to the reference [4] in the paper, compared to other methods like sparse subspace clustering, spectral curvature clustering, the RANSAC algorithm exhibits a competitive performance on small and medium datasets without too many outliers. In terms of the properties of changepoint sets that are discussed in the paper, RANSAC can be a good choice. Although the RANSAC is a statistical method, it can help find the optimal liner models from the given changepoints sets as discussed in the reference, which can be used as guard conditions. In this paper, we assume the guard conditions to be linear because this type of conditions is more common. If the changepoints set exhibit highly nonlinear, our framework may not work very well.

2) The error from RANSAC can be reflected on the time gap of mode transitions occurring between the original system and the estimated one, as shown in fig. 13. This error can be indirectly quantified by conformance degree, which is our future work.

3) The existing approaches presented in the related work section mainly focus on the hybrid systems that do not include linear guard conditions. So our main purpose of case studies is to demonstrate our framework can also handle the estimation of linear guard conditions with a good accuracy.

4) Thanks for your suggestions on other clustering methods. We will implement the k-plane algorithm in our framework and evaluate its performance against the RANSAC.

5) The $F()$ denotes the left side of an LMI as shown in equ.3. The $C\_i$ a vector with ith element equal 1 and the rest equal 0 and it’s used to select the trace of the ith state variable in equ.3. The function FnRecursive is defined at the second line of Algorithm 1.

6) Thanks for your suggestion. We will apply conformance degree to quantify the accuracy in Fig. 9, 10 and 13.

7) Thanks for the references and correction. We will compare our framework with the approaches in these references.

Review 4:

1) Thanks for your suggestion. We will try approximating a nonlinear hybrid system with our framework and evaluate its performance, and it can also be our next step which is to infer a linear hybrid system translated from a nonlinear hybrid system.

2) Thanks for your suggestion. We will add more description of the concepts introduced in the input/out traces.

3) Thanks for your suggestion. We will add more details of transformation from equ.1 to equ.2. $O$ denotes one trace segment of all the state variables and $\bf(1)$ denotes an all-ones vector.

4) The $C\_i$ a vector with ith element equal 1 and the rest equal 0 and it’s used to select the trace of the ith state variable in equ.3

5) Thanks for your suggestion. We will formalize this section in our revised version.

6) Thanks for your suggestion. We will modify the numbering and labeling and make them easily readable.