Summary of changes

(Reviewer #1)

First, we would like to thank the reviewer for his interest in our work and for helpful comments that will drastically improve the paper. As indicated below, we have checked all comments provided by the reviewer and have addressed necessary changes accordingly to his feedback.

Below are reviewer's comments and our responses:

C1: "*There is no "discussion" in the work, where it would be appropriate to discuss in detail the non-linear effects of disturbance propagation obtained in the work and their links to the processes in nature".*

R1: The discussion part has been added into the paper. There the non-linear effects are discussed.

C2: In Parts 2 and 3 all the variables and constants used in equations should better be listed once in a single table instead of repeating the terms in different equations with different meanings.

R2: We would like to thank the reviewer for this comment. The variables are now listed in Table 1.

C3: In Part 3 the simplest 1D case is considered, so, a disturbance, once emerged, can propagate only along the rod, and the law of its propagation is defined by the parameters E and ρ, which means that the disturbance can only propagate at the velocity of p-wave, because no other motion is possible.

A3: Yes, it is a 1D case, but the shear motion is allowed as well. So, it is not immediately obvious why it should be just p-wave velocity. To emphasise the point we modified the first sentence in the para after (9), which now reads "It is seen that despite the presence of shear springs and friction between the rod and the stiff surface the waves propagate with the p-wave velocity determined by the Young's modulus and density of the rod."

C4: The captions should be revised to make them more substantial, clarifying and informative.

A4: Thank you for your comment. It has been done.

Less important remarks:

C5: "Raw 38. Cohee and Beroza, 1994a → Cohee and Beroza, 1994"

A5: Thank you. It has been done.

C6: "Raws 48-49. "However, the faults ... can produce sliding over initially stable fractures/interfaces" – a citation is needed".

A6: Thank you. It has been done

C7: "Raw 64. The citations should better be replaced by (Brace & Byerlee, 1966)".

A7: Thank you. It has been done.

C8: "Raw 82, Eq. 2. As a matter of fact, this equation defines the rule of the frictional force action. When V=0 the frictional force can act on a body only provided that the shear force is not zero. In the presented system this condition is not true".

A8: We agree with the reviewer; it was a misprint. The system of equations has been corrected.

C9: "Raw 93, Eq.5. If all the variables are dimensionless, it is unclear, why the relation μN appears? It misses in the plots presented in Fig.2".

A9: Thank you. The Fig. 2 has been replaced.

C10: "Raw 95, Fig.2. Under the action of a frictional force constant modulo, the energy should dissipate, but it doesn't. This fact should be explained".

A10: Thank you. This has been added into the paper (lines 118-119). Please see below. "The energy in the system does not change with time, obviously due to the constant energy influx by velocity V_0 whose excess is dissipated by friction".

C11: Raw 105. Fig.2 presents harmonic oscillations, but not the regime of "stick-slip".

A11: These oscillations resemble stick-slip movement, but they manifest themselves in terms of sliding velocity rather than displacement.

C12: "Raw 114. τfr = kμσN. What is k"?

A12: Wrong formula was used. It has been corrected.

C13: "Raw 115, Fig.3. There is τf in the figure, but not τfr".

A13: Typo was in Eq.8. It has been corrected.

C14: "Raw 126, Eq.8. It is unclear, what is k – the stiffness of a single spring, of all the springs, or the specific stiffness of springs per unit length? Attention should be paid to Eq.1, where the same notation is used".

A14: We agree with the reviewer. It has been changed. The details are in the table 1.

C15: "Raw 129, Eq.9. The formula is presented in a faulty way. If one supposes that $\Delta V=u$ is a re-introduced new value, it appears that the increment of velocity equals to displacement, which is impossible".

A15: Awkward notation was used. *U* was not to be displacement. It has been changed.

C16: "Raws 137-145. Equations 11-14. All the constants and variables should be clarified".

A16: It has been done. Please see table 1.

C17: "Raw 145. Eq.14. What is the function J0, what are the coefficients i u b, and what is the difference between the Bessel functions J0 u J0'"?

A17: i – is imaginary unit; J_0 – is Bessel function; J_0'– is derivative of Bessel function. Please see table 1.

C18: "Part 3.1. Since the results are presented in the form of time series of dimensional variables, parameters of the model should be designated, which were used in calculations. The visual presentation of results is not pictorial enough. To my mind, the grid is too coarse. The dimensionality of Y-axis is not mentioned".

A18: Thank you for suggestion. We have modified the paper structure and data presentation.

C19: "Raw 152. Fig.3 (right). It is better to plot all the curves using a single X-axis, and one and the same scale of the Y-axes (may be, it's better to use the logarithmic scale)".

A19: Thank you for your suggestion. A confusing figure was used. It has been deleted.

C20: "Raw 152. Fig.3 (left). Propagation of the disturbance is not seen at all. The Y-axis should be inverted, or even better, re-calculated for the disturbance when $u(t, x) > 0$.
The function of pulse shape is specified in a poorly comprehensible way. It's better to give it in a standard mathematical form".

A20: Thank you for your suggestion. The Fig.3 was corrected. A standard mathematical formula was added, please see equation 15.

C21: "Raw 155, Fig.4 (left). The disturbance is not seen in the area of big t. The viewing angle should be changed. No need in the inscriptions in the plot".

A21: It has been done.

C22: "Raw 162, Fig.5. The amplitude of the disturbance is maximal at the initial moment and reduces with time (raw 158). But, in the figure the amplitude is zero in the range of 0-9 s, then it increases in the range of 10-14 s, and then it decreases. What really shown in the figure"?

A22: A confusing figure was used. It has been deleted.