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Identification of non-linear systems

IDENTIFICATION OF THE NON-LINEAR HYSTERETIC BEHAVIOUR
OF A BELT TENSIONER

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ABSTRACT:

Mechanical tensioners are widely used in belt drive systems of automotive engines [1], [2]. They act to maintain a minimum tension in the slack span and to decrease transverse belt vibrations. They are composed of an idler pulley, an arm lever and a torsional spring, see Figure 1.
The paper deals with the modeling of the dynamic behaviour of a tensioner. First an experimental investigation permits the characterisation of the tensioner: it is subjected to a force-deflection test carried out using a specific experimental set-up equipped with an electro-dynamic shaker. Figure 2 exhibits the non-linear hysteretic behaviour of the tested tensioner. The hysteretic loops are measured for several deflection amplitudes and forcing frequencies.

Then, the experimental characterization permits identifying the parameters required by the original hysteretic model presented in [3], and classical models like the Dahl’s model.

The last part is devoted to the comparison of the hysteretic loops given by the tested models and the experiment, as shown in Figure 2 for low frequency excitation.

![Figure 2: Comparison between model and experimental results](image)

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**REFERENCES:**