

Product Name :
Investigation of Simple Stability Problem

Product Code :
ALABS-A180-014



Description :

Investigation of Simple Stability Problem

Buckling is a stability problem which occurs in practice when slim components are subjected to compressive loading. Following a “disturbance” to its equilibrium, such as caused by compressive loading, a stable system returns to equilibrium when the loading is removed. If the compressive load increases excessively, instability of the system results. The component buckles and fails. The critical compressive load at which the system becomes unstable is termed the buckling force. A simple model for representing stability problems is a two-part bar with an elastic joint which remains stable up to a certain load level. If the buckling force is exceeded, the bar suddenly buckles and becomes unstable. This is done on a buckling bar under the aid of a scale on the load application lever. Experiments can depict a variety of conditions, such as an elastic joint or an elastic clamp fixing. Two tension springs serve as the elastic joint. For the elastic clamp fixing option, a steel leaf spring is mounted in the bottom joint. The variable length of the leaf spring means various degrees of clamping are possible. The two cases can be combined. Another experiment demonstrates the influence of additional shear forces. It involves applying a shear force to the joint in the buckling bar with a cable and a weight. In all experiments the buckling bar is placed under

load until it reaches an unstable situation. The length of the lever arm at which the buckling bar buckles is read from the scale and the buckling force is then determined. The various elements of the experiment are clearly laid-out and housed securely in a storage system. The complete experimental set-up is arranged in the frame. The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

Specification:

1. Investigation of the buckling load under different conditions (elastic joint, elastic fixed end)
2. Two-part buckling bar with central joint
3. Loading infinitely variable with lever and set of weights
4. Determination of loading via scale on load application lever
5. Various degrees of clamping via leaf spring with variable length on bottom support
6. Thrust pad guided friction-free inside spherical shell
7. Low-friction joints with roller bearings
8. Device to generate shear forces
9. Storage system to house the components

- 10 Experimental set-up in frame.

Technical Data:

Two-part buckling bar with central joint

- WxH: 20x20mm
- length: 2x250mm
- support: pinned-pinned (articulated-articulated)

Elastic joint

- 2 tension springs, rigidity: 2N/mm
- lever arm: 50mm

Elastic clamp fixing with steel leaf spring

- length: 500mm

- cross-section: 10x2mm

- 2nd moment of area: 6,66mm⁴

- modulus of elasticity: 205000N/mm²

Compressive force range: 25...120N

Shear force: 0...20N

Load application lever, lever ratio: 1:2 – 1:5

Set of weights

- 8x 1N

- 6x 5N

- 2x 1N (hangers)



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