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L. Zentner / V. Böhm

On the static deformation behaviour of compliant structures

ABSTRACT

An intrinsic compliance of technical systems is a momentous precondition in a lot of application-areas like medical technology and man-machine interaction. This requirement can be constructively satisfied by using compliant mechanisms. The poster presentation refers to a classification of the deformation behaviour of compliant mechanisms by means of practical models, to simplify their construction directly. The introduced classification which considers the static deformation behaviour of compliant mechanisms is supposed to forward their development and to facilitate their implementation in rigid body systems or the functional expanded substitution of individual parts of the rigid body. The meaningful application of compliant mechanisms especially of such structures with instable static behaviour offers a great development potential [1]. The role of the sensor system can be adopted partly or completely by “intelligent” mechanics. With the application of compliant structures and structural elements, which show an instable static behaviour and therefore segue from one state to another depending on external conditions, elementary characteristics of the system can change [2]. Hence such systems will autonomously and directly adapt to the working conditions.

In relation with functional dominating compliant characteristics many application-oriented tasks like special valves, finger-grabber with particular characteristics, medical structural elements and structures are conceivable. Especially in medicine compliant mechanisms can be applied in broad applications, i.e.:

- Compliant, jointed, fluidic driven probe;
- Mechanisms for transportation of the sensor system respective medicaments to the skin surface, realised by big stroke of snap-through bodies;
- Innovative bandages allowing a saltatory energy-release in the joint and thereby providing motion-sequences.

Due to active requests of industry mates the investigation and targeted application of these compliant structures, which have a hidden, cumulative potential to increase the functionality of systems obviously, are extended beyond.

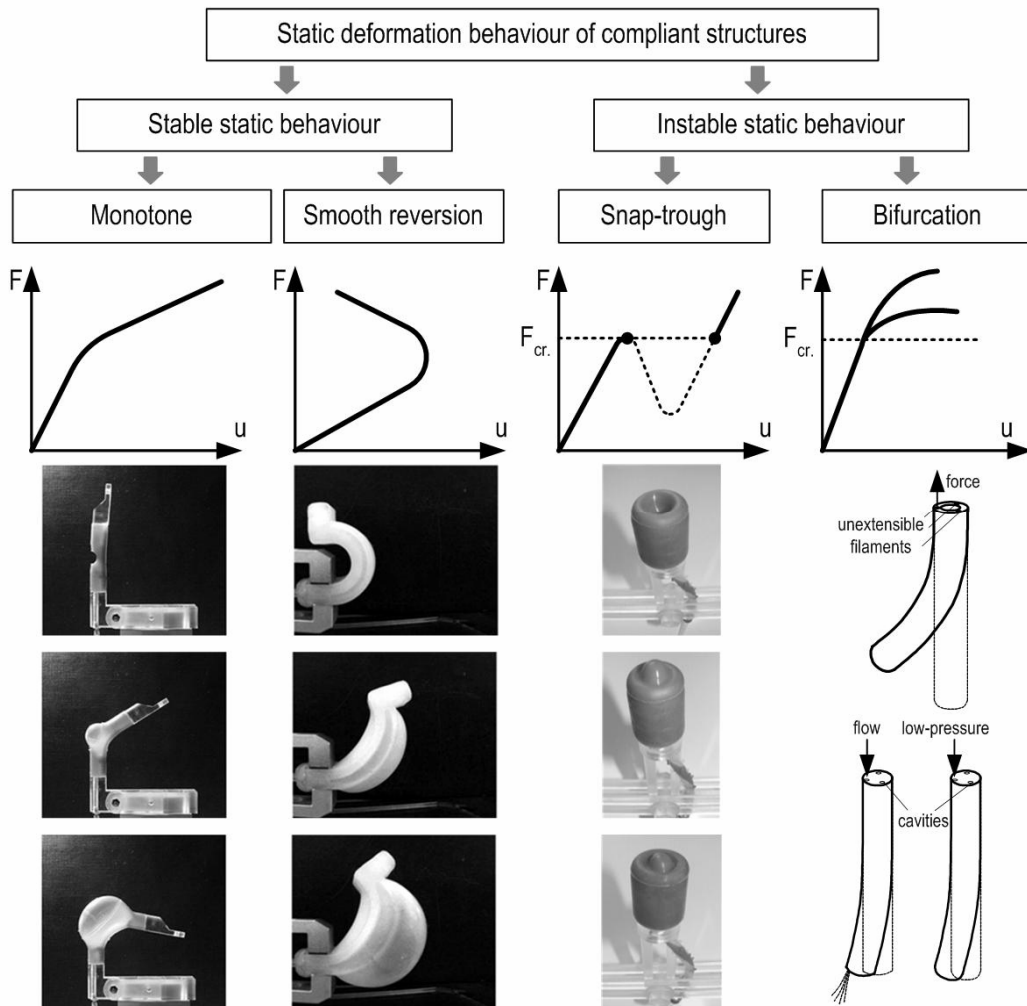


Figure 1: Classification of the static deformation of compliant structures and related examples with fluid driven actuators (u: deflection, F: force, $F_{cr.}$: critical force)

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