

Dielectric Elastomer Sensors

General features

Dielectric elastomer sensors (DES) consist of a highly stretchable elastomer film coated on both sides with also stretchable electrodes. The sensor effect is based on the change of the electrical capacitance upon stretching the elastomer film.

Applications

- Footstep sensors in floors
- Continuous measurement of liquid or gas pressure
- Monitoring of body functions such as respiration, pulse or blood pressure
- Seat occupancy sensor
- Detecting pressure distributions e. g. to prevent bedsores

Properties

- Manufacturing of sensor films up to 300 mm x 400 mm
- The preferred elastomer material is silicone rubber.
- The stiffness (Young's modulus 0.1 – 1 MPa) of the elastomer determines the sensor sensitivity.
- High stretchability of the sensor film up to 200 %
- The electrodes of the elastomer film consist of particles dispersed in a matrix and have a conductivity of 100 mS/cm or more.
- By patterning the electrodes on the elastomer film, also a sensor array with separated elements can be designed.
- Tested life time $3 \cdot 10^5$ cycles at 100 % strain, 1 Hz and room temperature

Characterization methods

- Electrical properties: capacitance, conductivity, also under stretch
- Mechanical properties: Young's modulus through stress-strain experiments