

TM 262

Hertzian pressure



Learning objectives/experiments

- resulting shape of the contact area under point contact with different radii of curvature
- shape of the contact area as a function of the contact force
- influence of an additional transverse component of the contact force

Description

- **demonstration of the contact area under Hertzian pressure**
- **generation of circular or elliptical contact areas**
- **especially clear results due to pairing transparent plastic with silicone rubber**

When two bodies with a convex surface are pressed against each other, ideally, these bodies only come into contact linearly or at one or more points. In the real world, as the two bodies approach each other, an elliptical contact area occurs at the contact point due to deformation. In this case, the compressive stresses (compression) are proportionally distributed to the deformations.

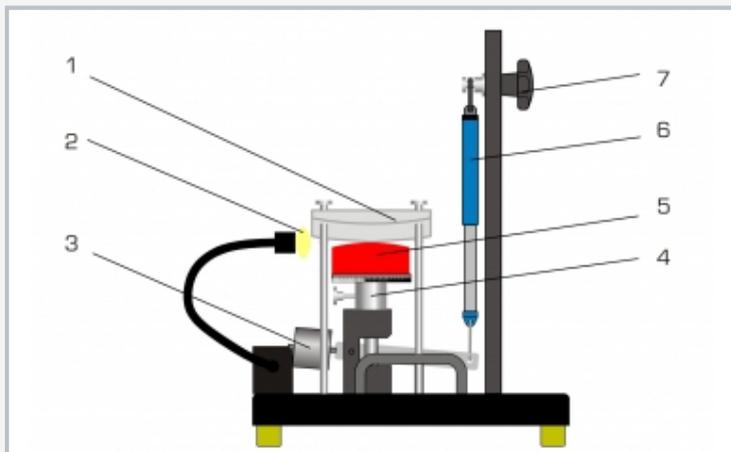
Heinrich Hertz, a physicist, developed a theory to calculate the largest pressure, also known as Hertzian pressure. The size and shape of the contact areas and the extent and distribution of the mechanical stresses under the contact areas can also be calculated.

The TM 262 experimental unit demonstrates the shape of the occurring contact area under Hertzian pressure as an example. A rubber pressure pad is pressed against a transparent plastic plate via a lever. The plate and pressure pad are curved. Both circular and elliptical contact areas can be generated.

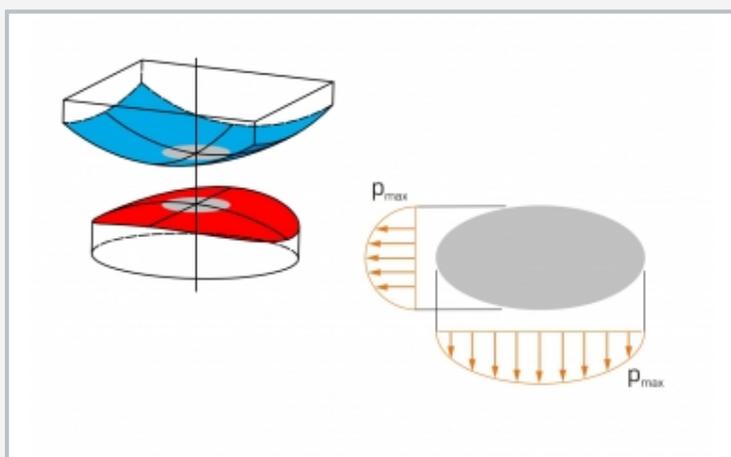
Using a spring balance, the force is measured at the lever and the contact force is determined. A halogen lamp at one side perfectly illuminates the contact area. Grid lines on the plastic plate make it easier to measure the contact area.

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1 double convex plexiglas disk, 2 halogen lamp, 3 sliding weight to compensate the mass of the load mechanism, 4 load mechanism, 5 rubber pressure pad with convex surface, 6 spring balance, 7 movable device for the spring balance



Contact area between two bodies with curved surfaces;
grey: contact area in the shape of an ellipse, orange compressive force (pressure)

Specification

- [1] demonstration of Hertzian pressure
- [2] silicone rubber pressure pad
- [3] transparent plastic plate with grid lines makes it easier to measure the contact area
- [4] spring scale to measure force
- [5] movable device for the spring balance to generate a continuously adjustable contact force
- [6] optimum illumination of the contact area by side-mounted halogen lamp

Technical data

Spring balance

- 0...25N
- graduation: 0,5N

Pressure pad

- 60 Shore

Halogen lamp

- voltage: 12V
- power: 20W

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 400x400x530mm

Weight: approx. 16kg

Scope of delivery

- 1 experimental unit
- 1 spring balance
- 1 halogen lamp
- 1 set of instructional material

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Optional accessories

020.30009

WP 300.09

Laboratory trolley