



$(\frac{d}{R})$   
 $d >$   
 $1mm$   
 $R <$   
 $50mm$   
 $R_{cylinder} =$   
 $30mm$   
 $R_{out} =$   
 $25mm$   
 $b =$   
 $30mm$   
 $??$   
 $1/female_mold.jpg$  Longitudinal section of the female mold  
 $R_{in} =$   
 $R_{cylinder} =$   
 $30mm$   
 $5mm$   
 $5mm$   
 $5$   
 $1/sleeve_translation.jpg$  longitudinal section of the sleeve  
 $??$   
 $R_{int} <$   
 $R_{out}$   
 $R_{int} =$   
 $18.5mm, 20mm, 23mm$   
 $1$   
 $1/male_mold.jpg$  longitudinal section of the male mold  
 $R_{in} =$   
 $R_{cylinder} =$   
 $30mm$   
 $5mm$   
 $50mm$   
 $??$   
 $1/rolling_machine.png$  Pastamaker

®

®  
 $\frac{d}{dt}$   
 $\frac{1}{A}$   
 $\frac{1}{B}$

$$\frac{R_{int}}{t_h}?$$

$$\begin{array}{c} 5 \\ \textcircled{\text{R}} \\ 2\pi R_{out} \approx \\ 157mm \\ 6 \end{array}$$

$\rho$   
 $\mu$   
 $\frac{1}{7}$   
 $??$   
 $1/schematic\_experimental\_setup.png$  Schematic of the spring experiment  
 $??$   
 $3 \cdot 10^5 Pa$   
 $1/cuve.pdf$  Schematic of the pressurizable tank  
 $F_{measured} =$   
 $K \Delta x$   
 $\lesssim 20\%$   
 $\textcircled{R}$   
 $?$   
 $P_c \propto$   
 $(\frac{d}{R})^2$   
 $6.4 \cdot 10^{-3}$   
 $6.76 \cdot 10^{-2}$   
 $\textcircled{C}$   
 $??$   
 $\mu$   
 $1/OB1.png$  OB1 pressure controller  
 $\textcircled{C}$   
 $\mu$   
 $f =$   
 $\textcircled{C}$   
 $??$   
 $1/schematic\_experimental\_setup\_light\_lenses.png$  Representation of the light and camera disposition

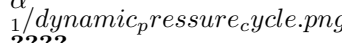
$$\begin{array}{r}
 8 \\
 77 \\
 77 \\
 \hline
 -3 \\
 -3 \\
 -6
 \end{array}$$





12

??

Qualitative representation of pressure cycles applied for the dynamic experiments

???

??

$\frac{d}{R} - 1$

$\frac{d}{R} =$

$\frac{d}{R} =$

$\frac{d}{R} =$

$$\theta_0^{14}$$

$$a_k^{14}$$

$$k=0,\ldots,M$$

$$\tilde{R}_{exp}(\theta)_i - \tilde{R}(\theta)_i$$

”Levenberg-Marquardt”  
 ”least-squares”  
 1/outer\_contour.png Fitted outer contouring green, and center of the parametric curve in blue  
 ??  
 1/concavity\_extraction.png Extraction of the concavity experimental points  
 $M(R_h, \theta_h)$   
 $\tan(\theta + \alpha) = 0$

(1)

$$\frac{\tilde{R}(\theta)}{\tilde{R}'(\theta)}$$

(2)

$$\frac{\tan(\theta) + \tan(\alpha)}{1 - \tan(\theta)\tan(\alpha)} = \frac{\tan(\theta) + \left| \frac{\tilde{R}(\theta)}{\tilde{R}'(\theta)} \right|}{\tan(\theta) + \frac{\sum_{k=0}^M a_k \sin(\theta)^k}{\cos(\theta) \sum_{k=1}^M k a_k \sin(\theta)^{(k-1)}}} =$$

$$\tilde{R}(\theta) = \sum_{k=0}^M a_k \sin(\theta)^k$$

$$\theta \in [-\pi - \theta_h, \theta_h]$$

$$M(R_h, \theta_h)$$

$$6 + bx^4 + cx^2 + d$$

with the following continuity conditions on and  $d =$

$$-cx_c^2 - bx_c^4 - ax_c^6 + y_c$$

and  $c =$

$$-2bx_c^2 - 3ax_c^4$$

$a, b, c, d$   
 $x_c, y_c$   
 $M(R_h, \theta_h)$   
 ”Levenberg-Marquardt”  
 ??  
 15  
 $\theta_h$   
 $\frac{\pi}{2}$   
 1/outer\_contour\_complete.png Fitted outer contour in blue, fitted concavity in red, and experimental concavity points in yellow