EXPERIMENTAL INVESTIGATIONS IN UNIAXIAL TENSION AND NUMERICAL SOLUTIONS FOR CURVE FITTING PART 2 – EXPERIMENTAL RESULTS

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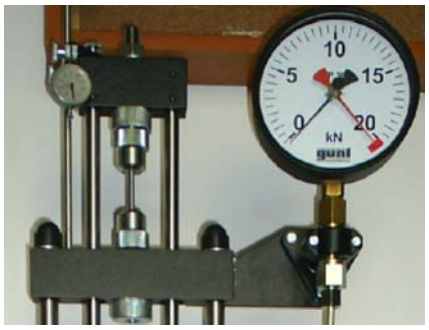
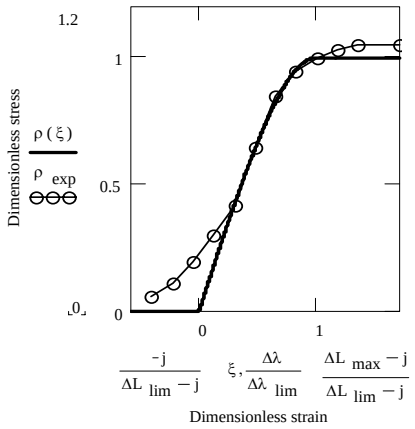
Abstract. The paper presents a method of understanding an experimental curve obtained during uniaxial tension test. The experimental curve is comparable to an analytical function, namely a conjugate hyperbola, described in part 1, [1]. The paper presents the experimental method and the curve fitting, as shown in Table 1. Subsequently, the yielding stresses are found and elastic moduli, secant modulus and tangent modulus are computed for some essential points from characteristic curve, with equations (1) and (2) respectively:

Table 1. Uniaxial tension test

Experimental equipment Probe and instruments	*Matrix of experimental results: k, ΔL and F Experimental data and approximation curve*	
	$P := \begin{bmatrix} 1 & 5 & 0.7 \\ 2 & 10 & 1.4 \\ 3 & 15 & 2.4 \\ 4 & 20 & 3.7 \\ 5 & 25 & 5.2 \\ 6 & 30 & 8.0 \\ 7 & 35 & 10.5 \\ 8 & 40 & 11.7 \\ 9 & 45 & 12.4 \\ 10 & 50 & 12.8 \\ 11 & 55 & 13.0 \\ 12 & 65 & 13.0 \end{bmatrix}$	

$$\rho(\xi) = \left[1 - (\sqrt{\alpha^2 + (1-\xi)^2} - \alpha)(\sqrt{\alpha^2 + 1} - \alpha)^{-1}\right]\Phi[\xi(1-\xi)] + \Phi(\xi - 1), \tag{1}$$

$$E_{tan} = \frac{d\sigma}{d\varepsilon} = E_{lim}\frac{d\rho}{d\xi} = E_{lim}\frac{1-\xi}{\sqrt{\alpha^2 + (1-\xi^2)}\sqrt{\alpha^2 + 1} - \alpha}. \tag{2}$$

where ρ is the dimensionless stress, Φ is the step function and α is a parameter numerically found.

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