EXPERIMENTAL INVESTIGATIONS IN UNIAXIAL TENSION AND NUMERICAL SOLUTIONS FOR CURVE FITTING: PART 1 – THEORETICAL PREDICTION

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Abstract: The paper proposes a numerical method for finding an analytical function able to approximate the shape of an experimental mechanical characteristic in tension. The suggested function is the portion of conjugate hyperbola, as presented in Fig. 1.

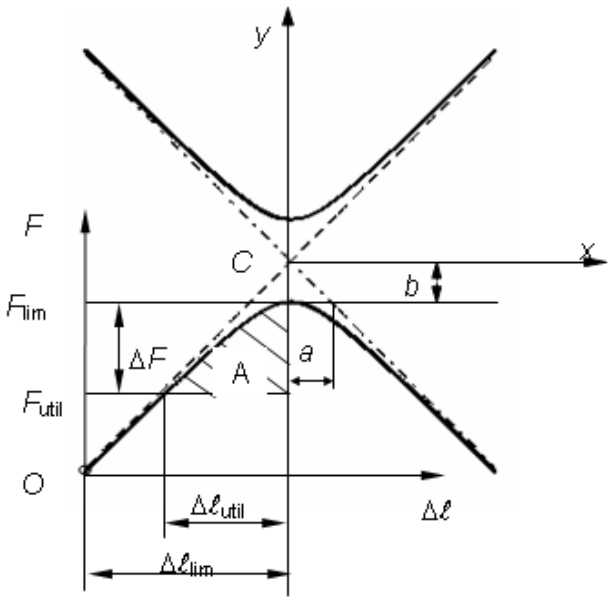

Fig. 1. *The mathematical model for analytical solutions*

The equation of the curve which best approximates the shape of experimental points has the form:

$$y = -\Delta F \frac{\sqrt{a^2 + x^2}}{\sqrt{a^2 + \Delta\ell_{util}^2} - a}. \tag{1}$$

The *a* parameter is found by numerical calculus, solving the following equation:

$$\sum_{k=m}^{n-1} \left(\Delta L_{k+1} - \Delta L_k\right)\left(\frac{F_k + F_{k+1}}{2} - F_{util}\right) = \int_0^{\Delta\ell_{util}} \left(b + \Delta F - |y|\right) dx \tag{2}$$

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