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Classical Solution of Wave equation

$$\nabla^2 u = \frac{1}{c^2}\frac{\partial^2 u}{\partial t^2} \quad ; \quad \text{u : displacement}$$

- One dimensional

$$\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 u}{\partial t^2}$$

$$u\,(x,t) = f\,(x - ct) + g\,(x + ct)$$

- Spherical Symmetry

$$\frac{\partial^2 u}{\partial r^2} + \frac{2}{r}\frac{\partial u}{\partial r} - \frac{2u}{r^2} = \frac{1}{c^2}\frac{\partial^2 u}{\partial t^2}$$

$$u(r,t) = f\,\frac{(r - ct)}{r} + g\,\frac{(r + ct)}{r}$$

- Cylindrical Symmetry

$$\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} - \frac{u}{r^2} = \frac{1}{c^2}\frac{\partial^2 u}{\partial t^2}$$

$$u\,(r, t) = \sum_{n=1}^{\infty} c_n J_1(\varepsilon_n \xi)\cos(\varepsilon_n \theta)$$

$$\xi = r/R, \theta = ct/R$$

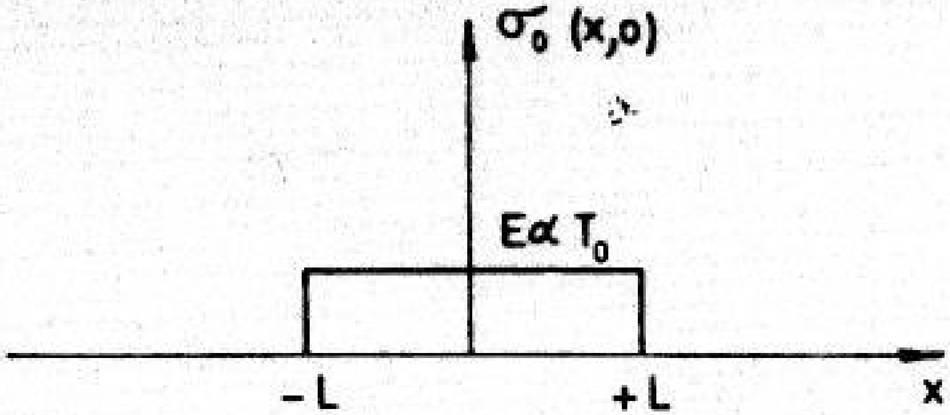


Fig. 1 Initial axial stress distribution in an instantaneously heated rod.

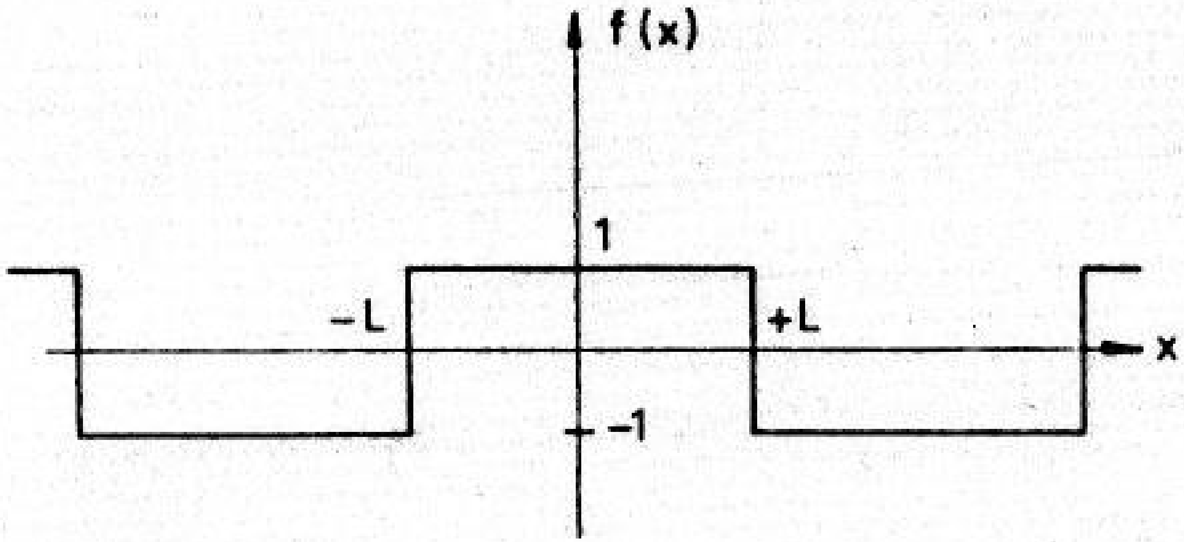


Fig. 2 The square wave describing the initial axial stress distribution in the rod $-L \leq x \leq +L$.

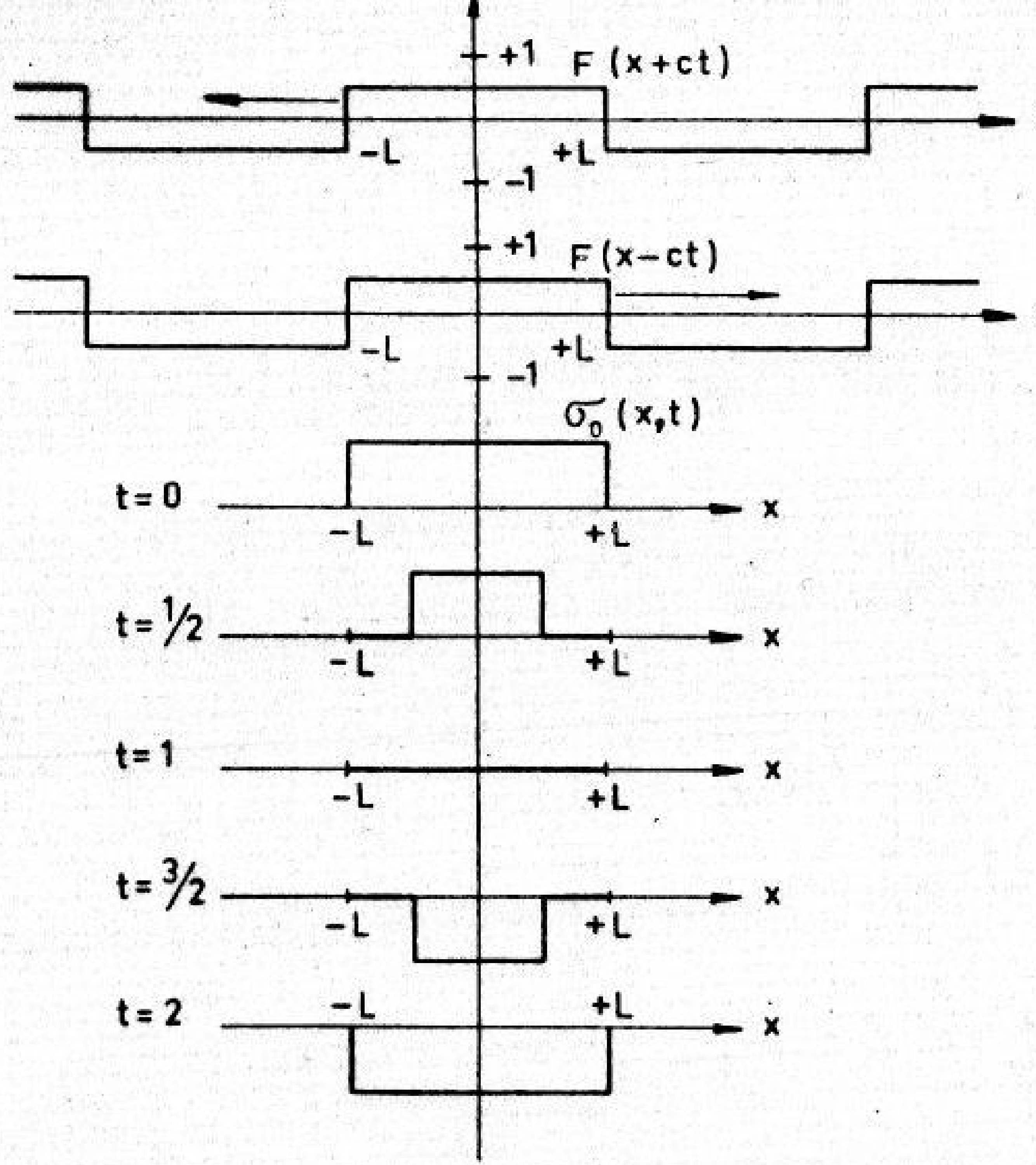
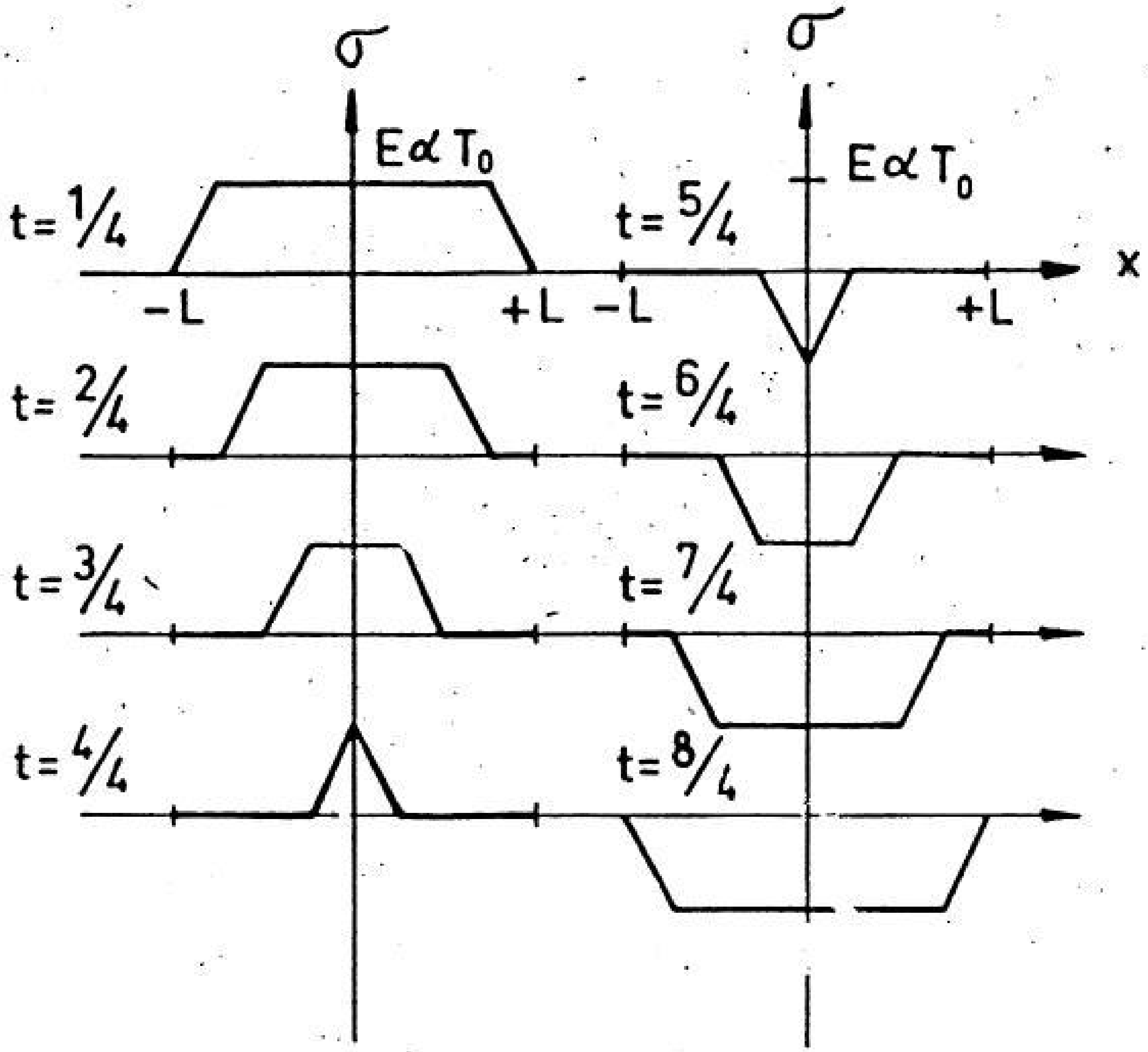
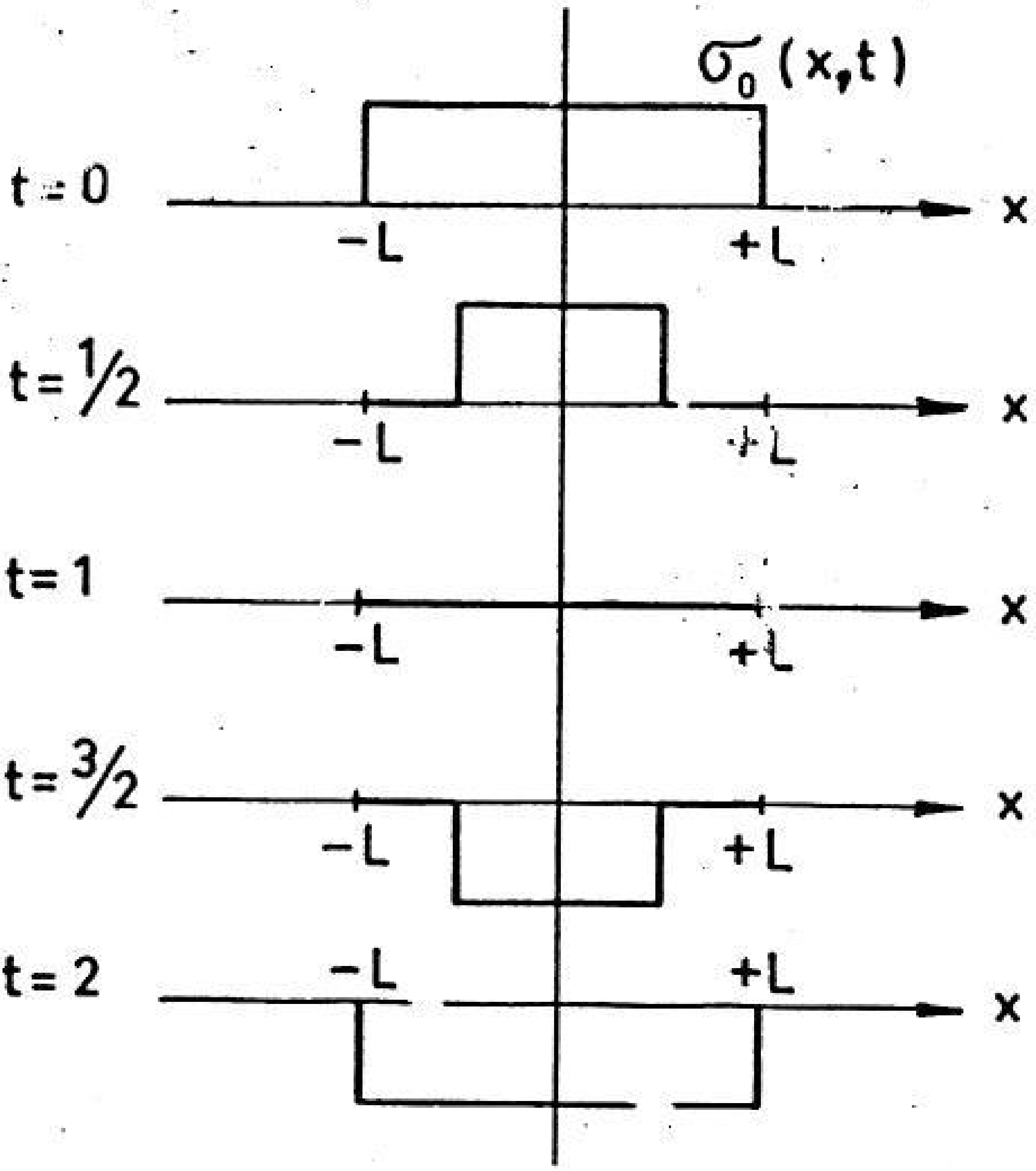


Fig. 3 The development of the axial stress in the instantaneously heated rod, obtained by the superposition of two square waves $F(x,t)$, travelling in opposite directions. The time t is measured in units of L/c.


σ
σ
EαT0
EαT0
t = 1/4
t = 2/4
t = 3/4
t = 4/4
t = 5/4
t = 6/4
t = 7/4
t = 8/4
−L
+L
−L
+L
x


σ0 (x,t)
t = 0
t = 1/2
t = 1
t = 3/2
t = 2
−L
+L
x

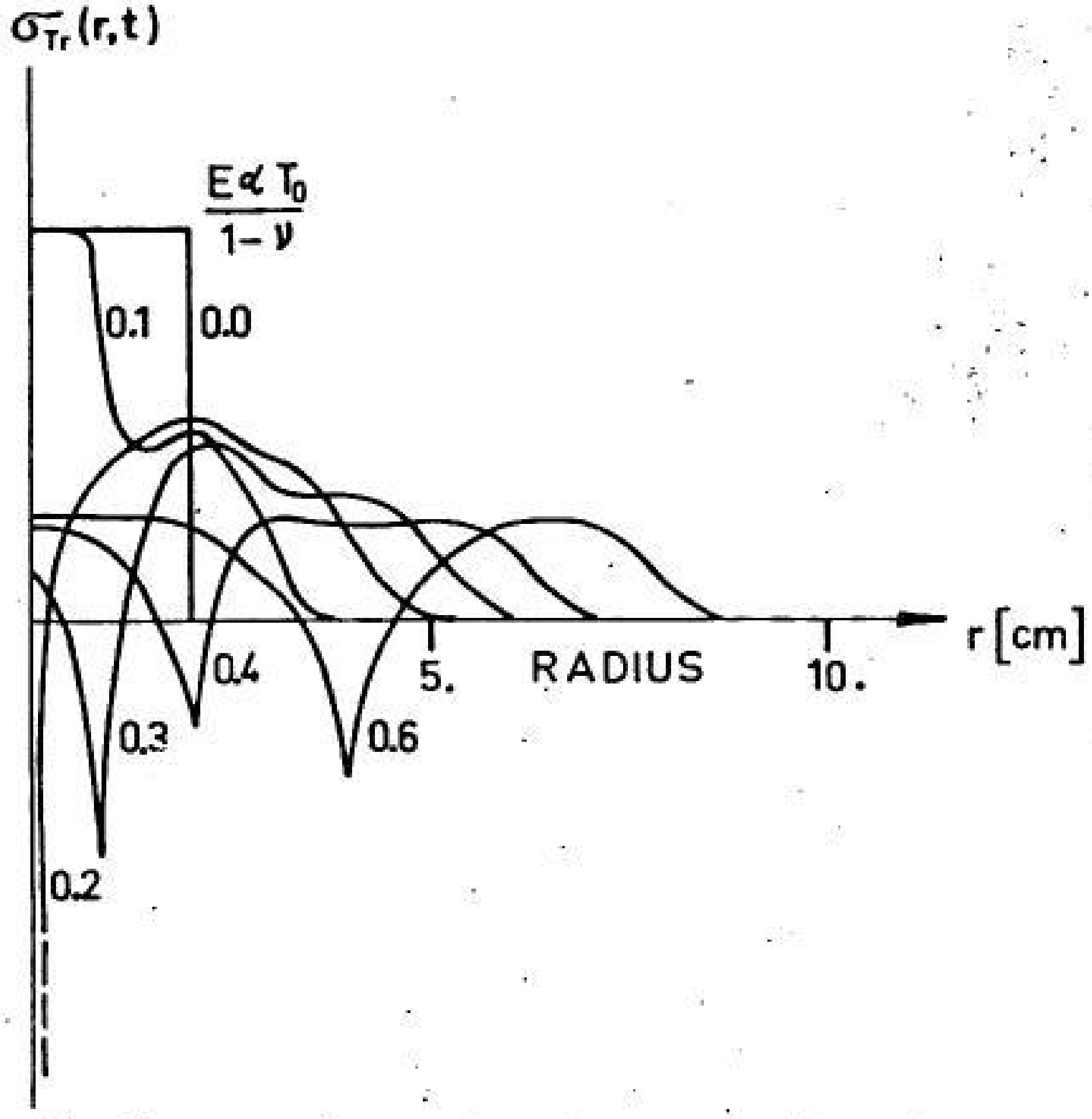


Fig. 13 The total (quasi-static plus dynamic) radial stress in an instantaneously heated Al disk of radius R at different times. The time parameters are given in units of R/c.

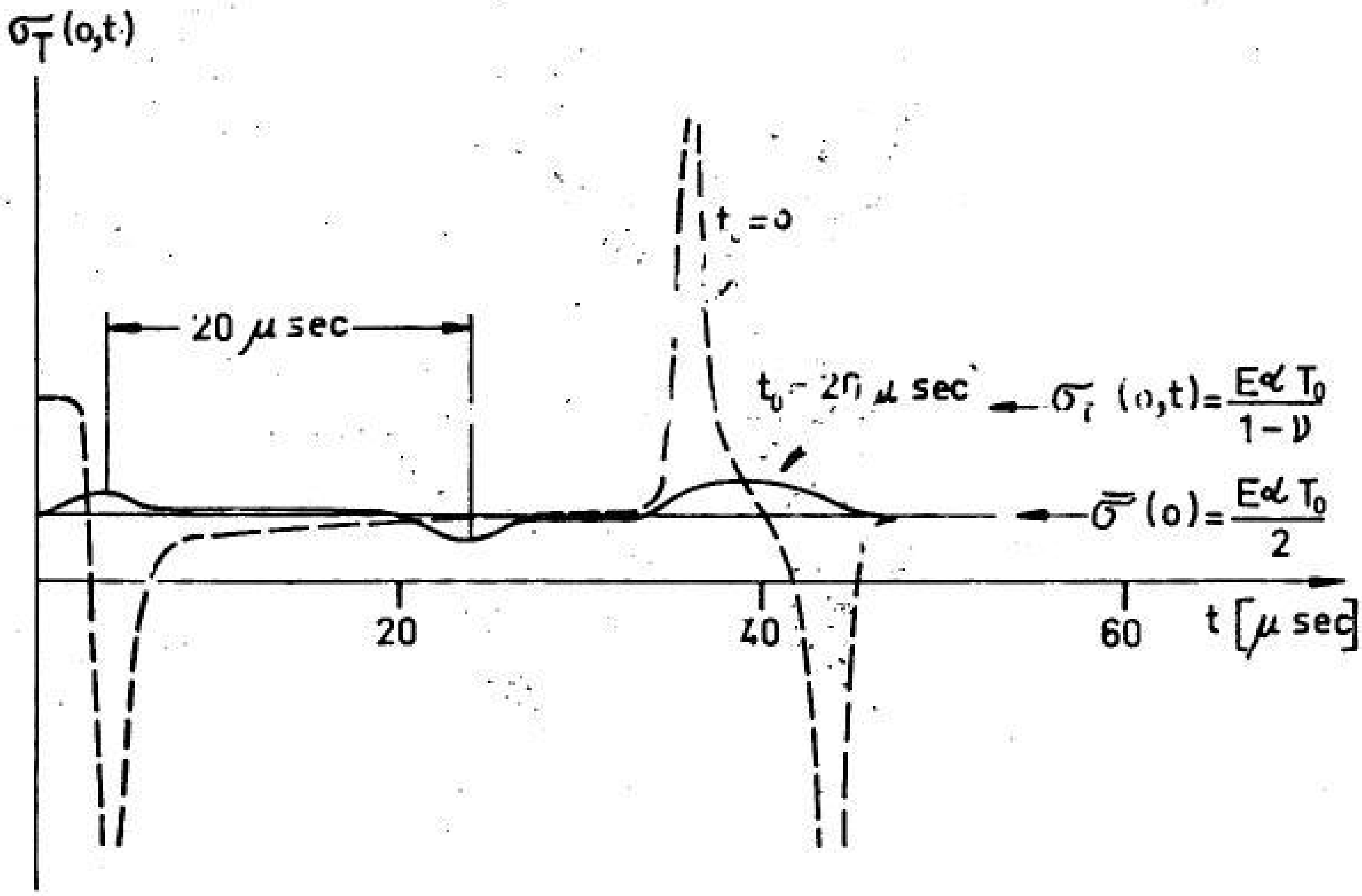


Fig. 14 The development of the total central stress in time for an infinitely rapid ($t_0 = 0$) and a finite ($t_0 = 20$ μsec) temperature increase.

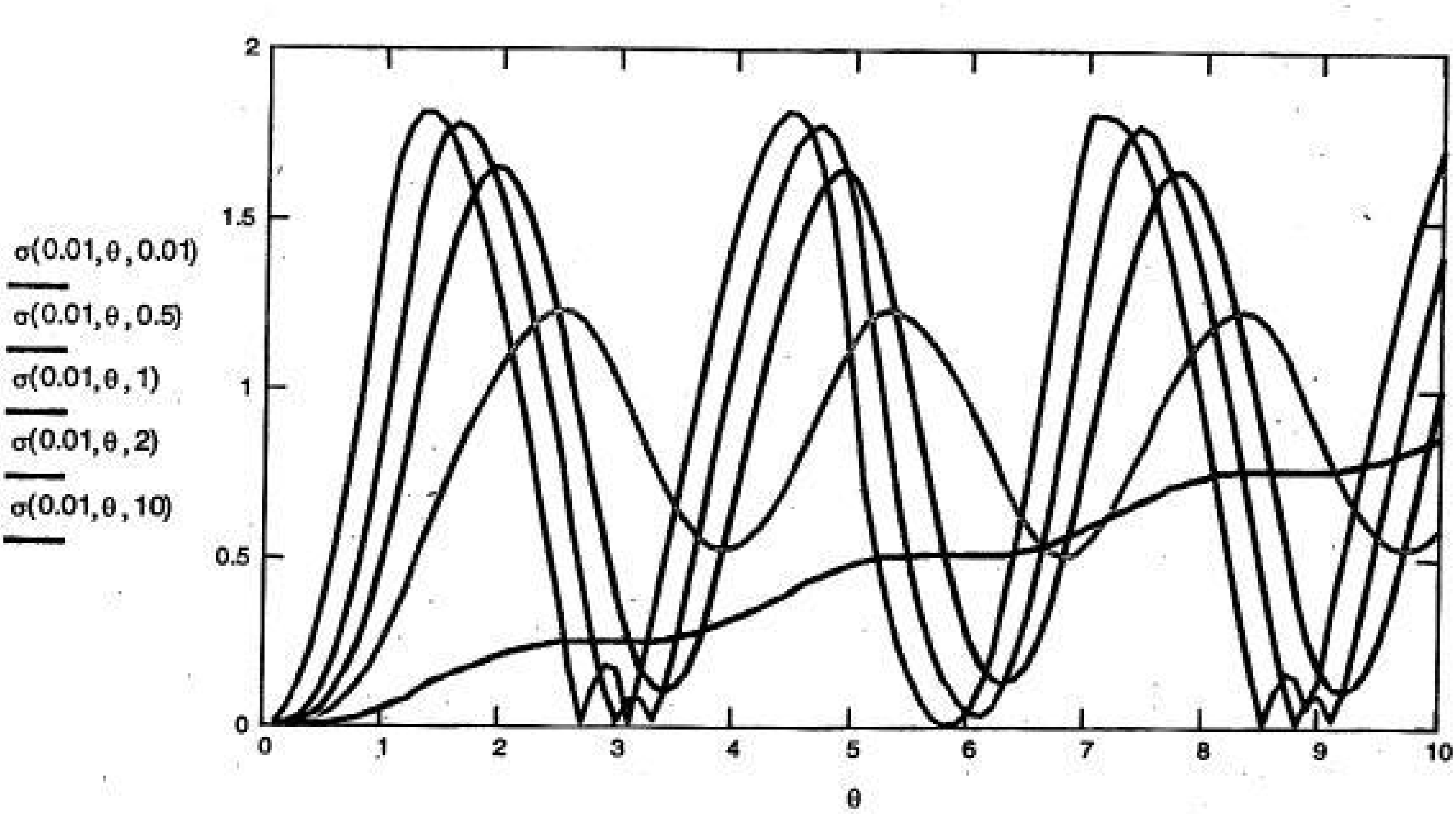


Fig. 1: Equivalent v. Mieses stress (in relative units of $E\alpha_L \Delta T_0$) vs. time θ (θ in relative units of R/c) in the center of a solid target. In addition to the black curve, which is for infinitely fast heating, also oscillations are shown for uniform heating over the durations $\theta_0 = 0.5, 1,\ 2$ and 10 (θ_0 in units of R/c).

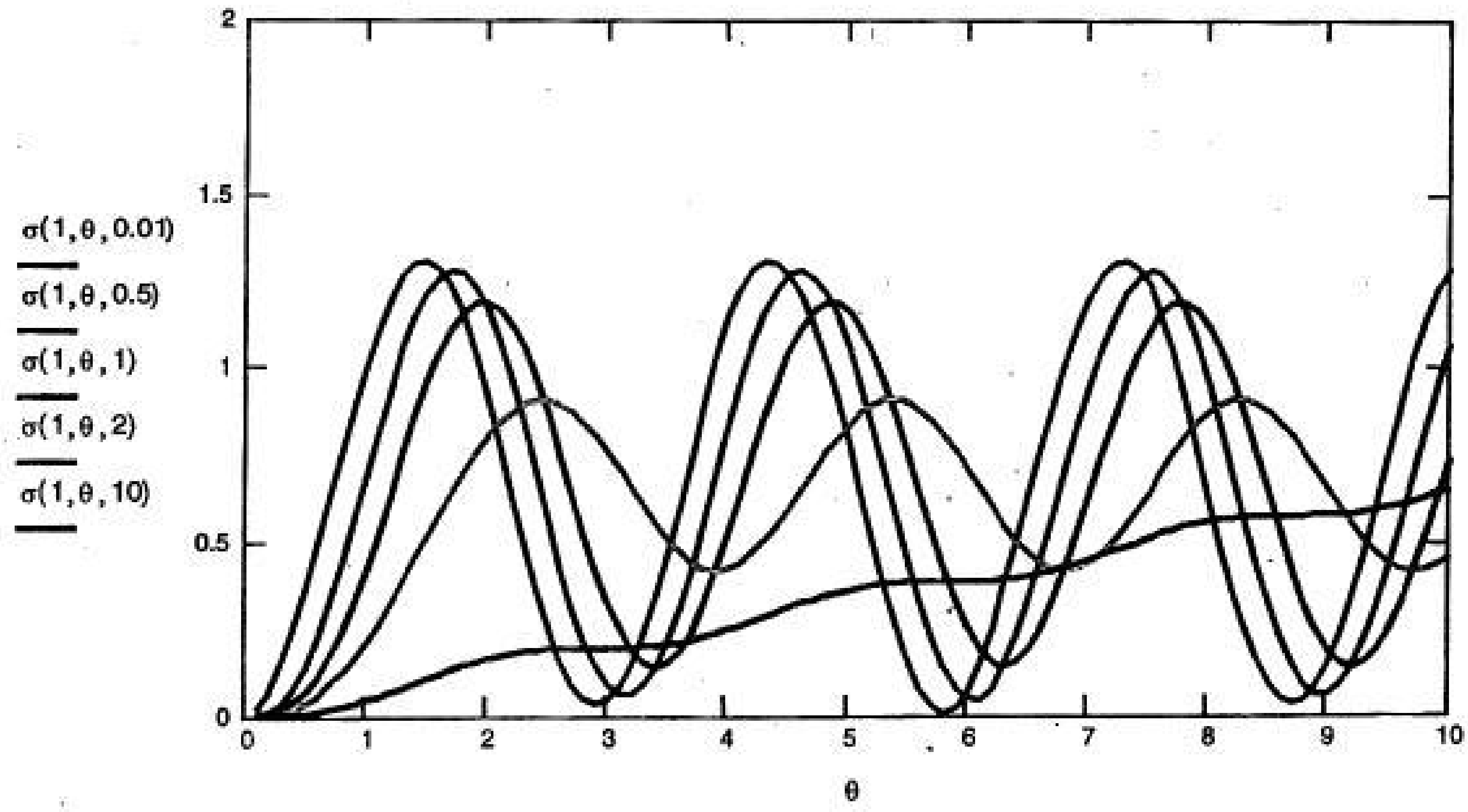
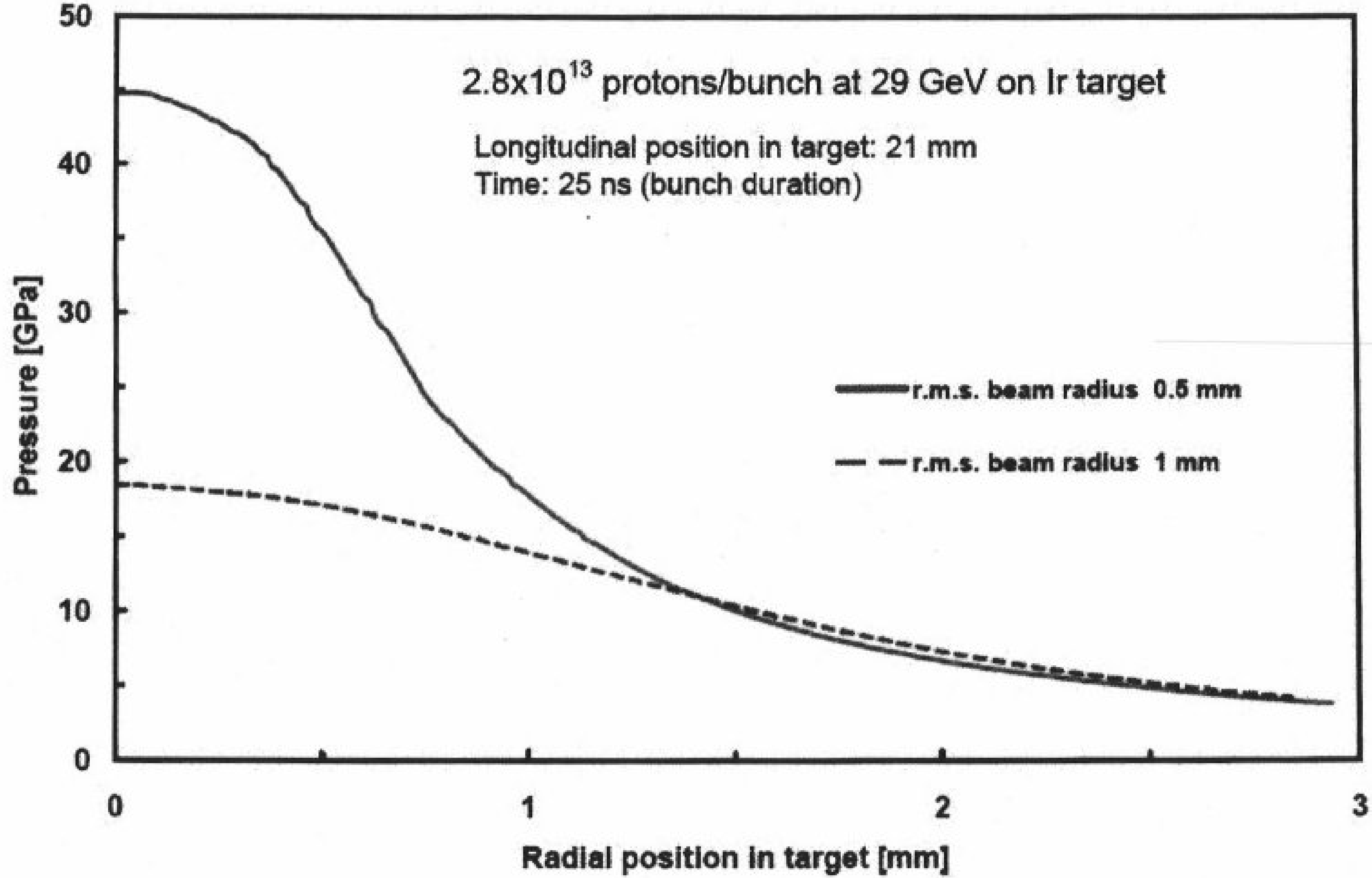


Fig. 2: Equivalent v. Mieses stress vs. time at the outer radius of a solid target. The same units as in Fig. 1 apply.

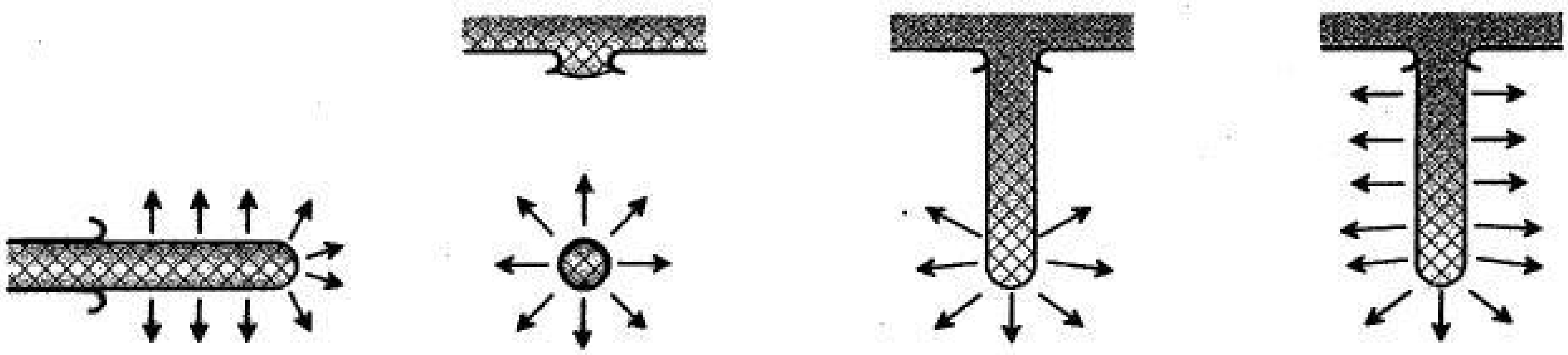
Pressure in Ir

(by N. Tahir, Aug. 2006)



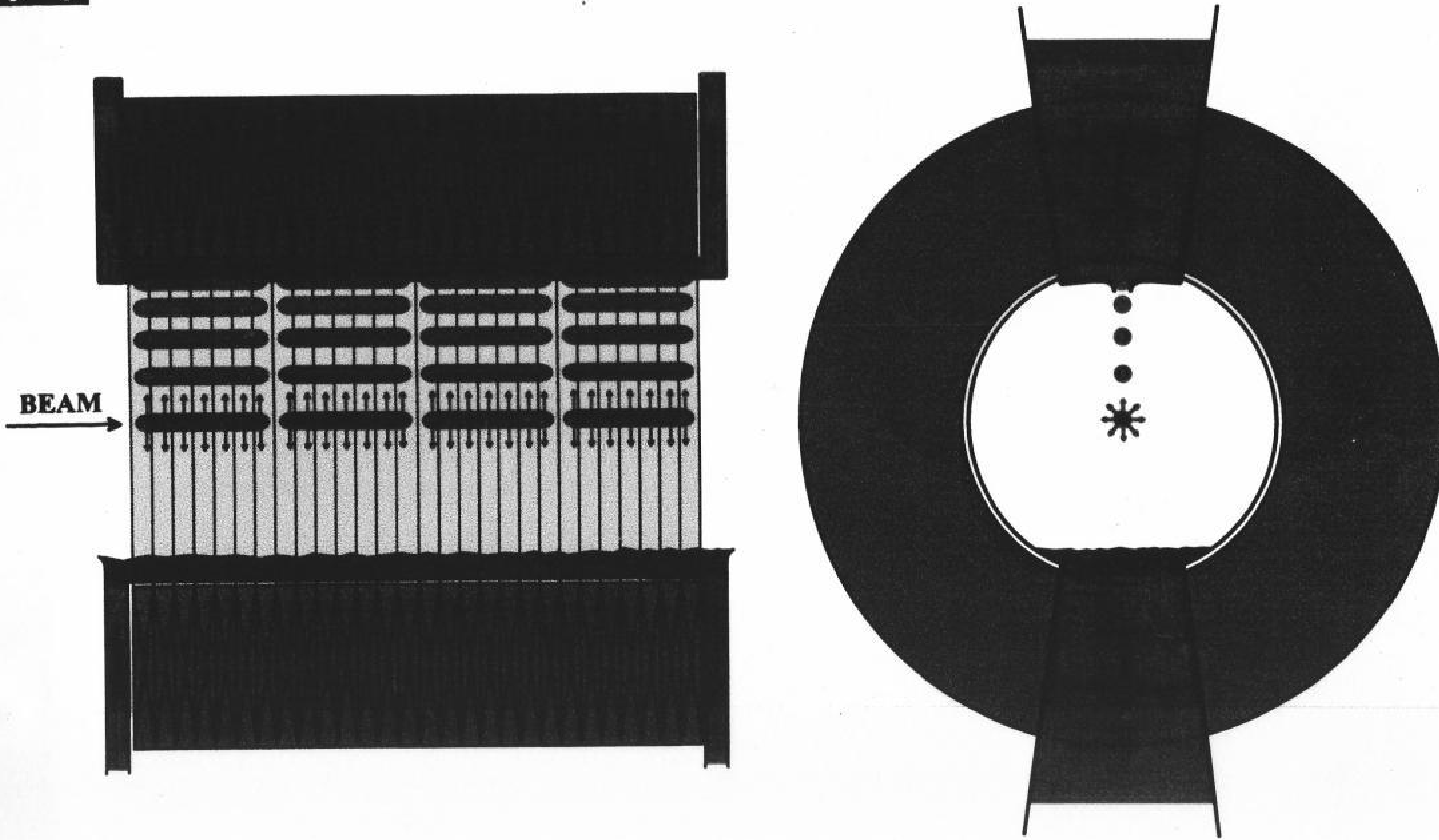
Burst Frequency : 50 Hz

Target : 1cm x 1cm
L = 40cm

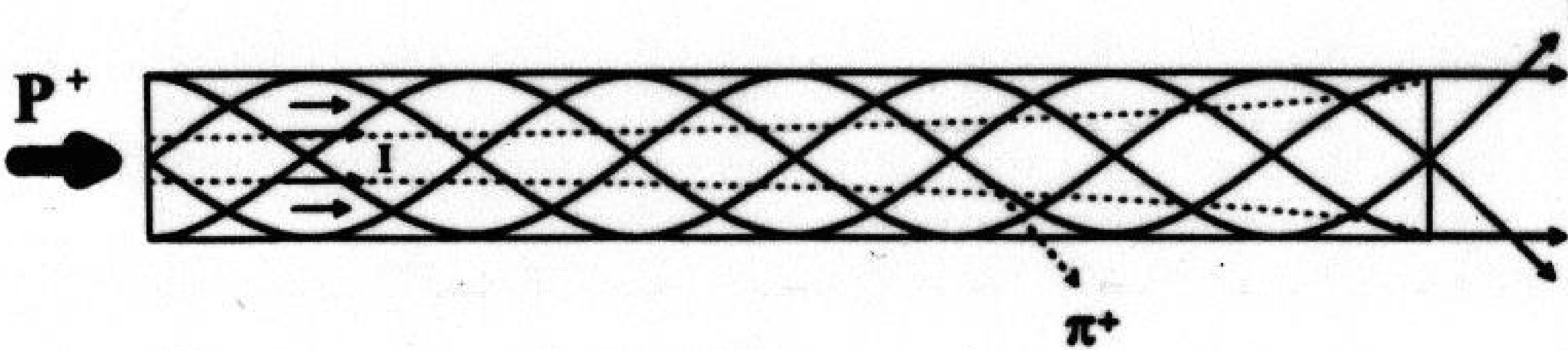


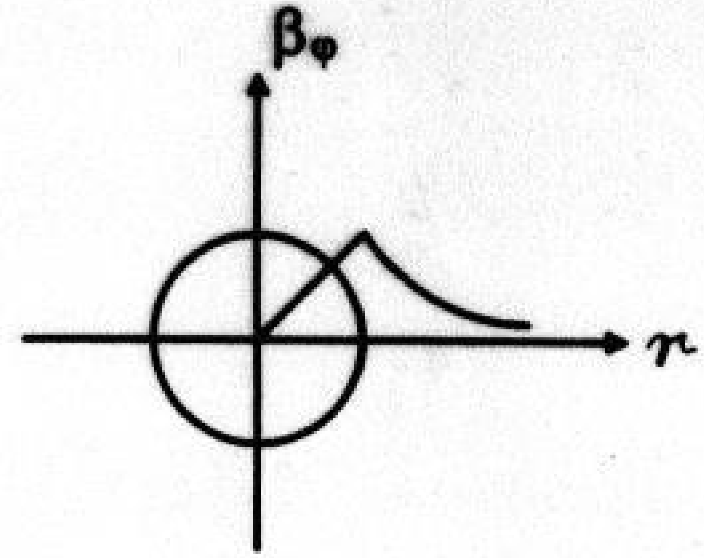
	Free Jet	Pulsed Curtain	Continuous Curtain: Tip explodes	Continuous Curtain: Curtain explodes
Volume Flow (cm^3/s)	2000.	2000.	2000.	5000.
Velocity at nozzle (m/s)	>20.	1.25	0.5	1.25
Pressure (kPa)	2700	10.5 Pulsed Pressure. Mech. or el. magn. valve	1.7	10.5

LIQUID TARGET RADIAL INJECTION INTO SOLENOID

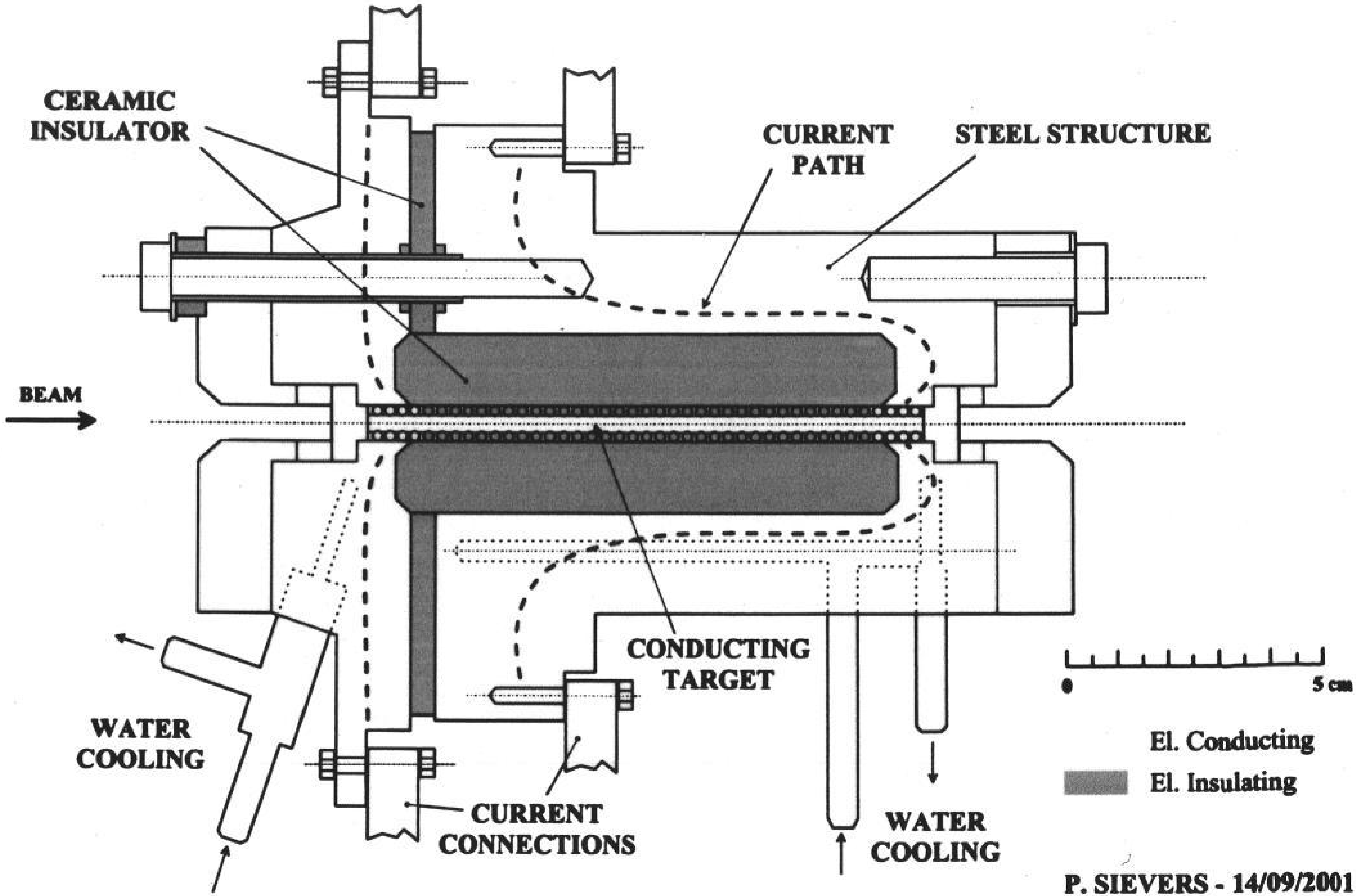


P. SIEVERS 23/05/2000


P+
I
π-
π+


βφ
r

PULSED TARGET



P. SIEVERS - 14/09/2001