ULTRASONIC CAVITATION INDUCED BY NUCLEAR RECOILS

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SUMMARY

Previous work[1] on ultrasonic cavitation induced by neutrons is reviewed. The sound pressure amplitude reached with a non-focussing Ni-sound generator in the liquid CCl_3F (at 20°C) was approximately 6 atm, with was sufficient to obtain continuous sensitivity for nuclear recoils due to neutron reactions for neutrons from a Pu-Be source. It was pointed out, that higher pressure amplitudes could be obtained with an arrangement in which the sound waves are focussed. The required pressure amplitudes for sensitivity for particles of different specific energy loss have since been measured for the same liquid by means of the spinner method[2], which allows to obtain radiation sensitivity in the negative pressure region down to minimum ionization. The corresponding sound pressure amplitudes would be for fission recoils 1.1 atm, for recoils from α-decay 6.0 atm, for recoils from neutron reactions (Pu-Be source) 6-15 atm, for α-particles (Bragg maximum) 14 atm, for γ-rays (minimum ionization) 60 atm.

For fission recoils, and α-recoils it has been found that the sensitivity has a very sharp threshold, going from zero to 100% sensitivity in a few per cent of the pressure amplitude. The ultrasonic cavitation due to neutrons in CCl_3F in an open container of a movie picture is shown in three pictures in Fig. 1.

References

1. B. Hahn and R.N. Peacock, Nuclear instruments and methods, 20, 133, (1963) and Il Nuovo Cimento X, 28, 334, (1963).

2. B. Hahn, Il Nuovo Cimento X, 22, 650, (1961).

Figure caption

Fig. 1 Cavitation in CCl_3F due to Pu-Be neutrons; sound pressure head on top, neutron source at the left.

a) source far away;

b) near by;

c) close by to the liquid container.

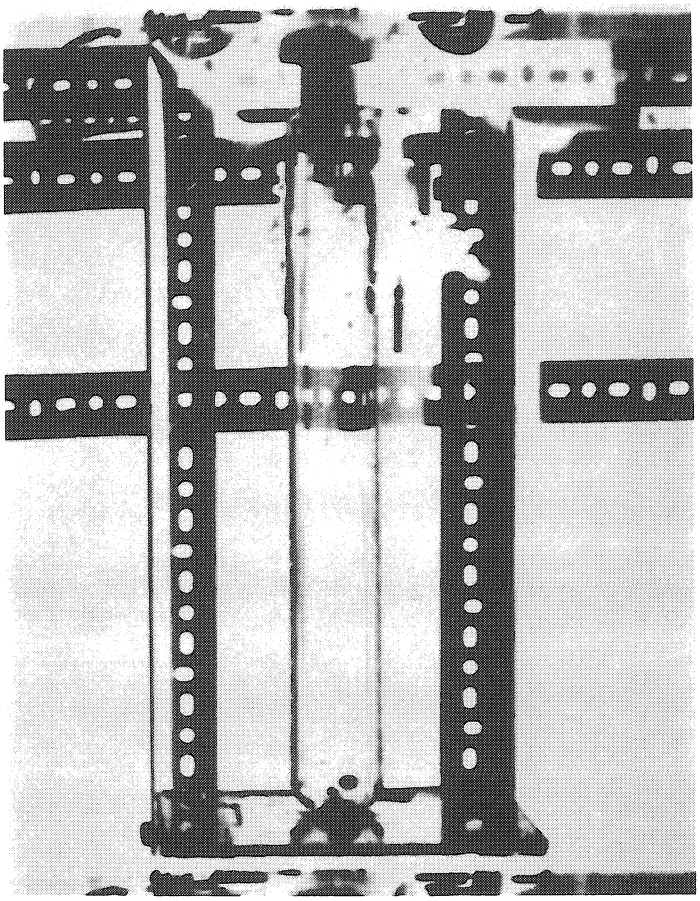

Fig. 1a

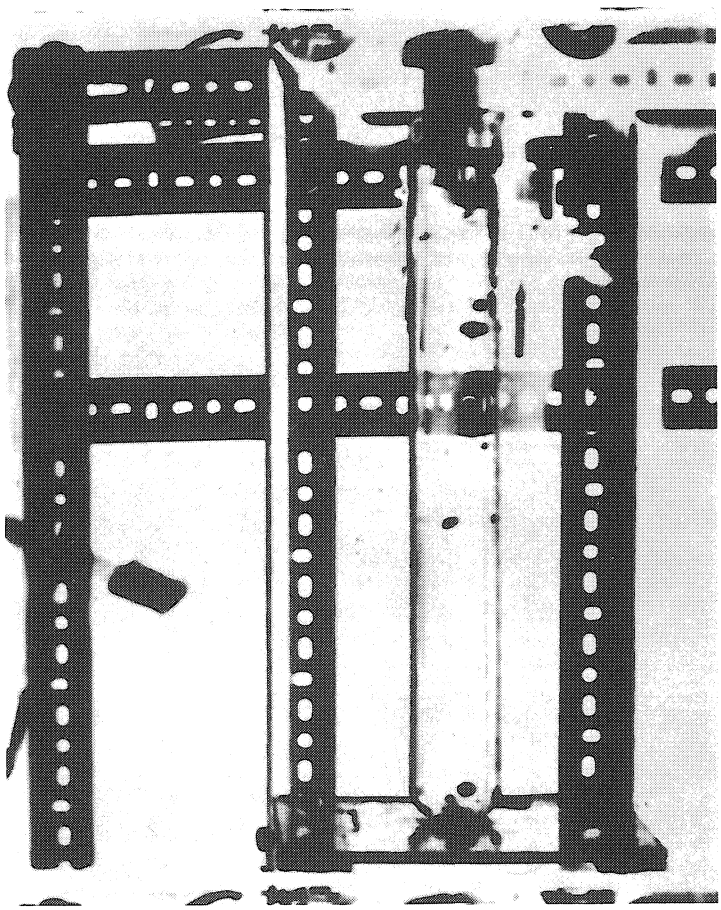

Fig. 1b

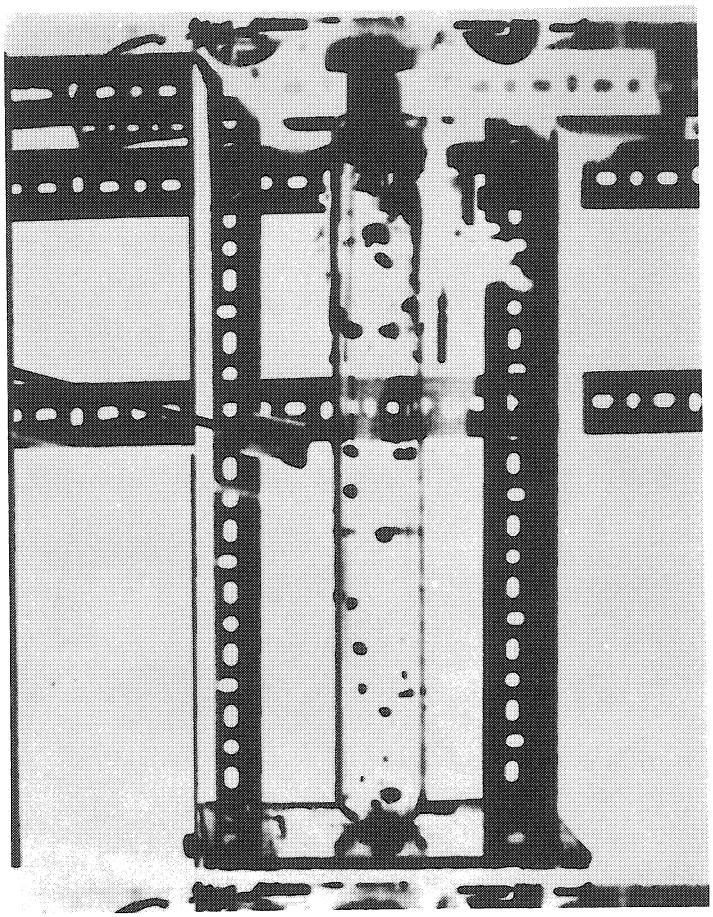

Fig. 1c