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N.I. Shtefan, Doctor of philosophy, Associate Professor
(National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine)
e-mail: nishtefan@gmail.com

THE INFLUENCE OF THE EXTERNAL LOAD AMPLITUDE ON THE DEGREE OF ROTATIONAL SHELLS DEFORMATION WITH FLUID BETWEEN THEM

One of the questions that were studied in a problem of hydroelasticity [1] on the example of a structure, which consists of two coaxial cylindrical shells interacting with the help of fluid, was the question of the influence of destroying of the fluid and bubbles, which are in fluid, on the deforming of the structure under external impulse loading. Apart from this question, another one has been brought up – about the influence of the amplitude of this loading on shells deformation.

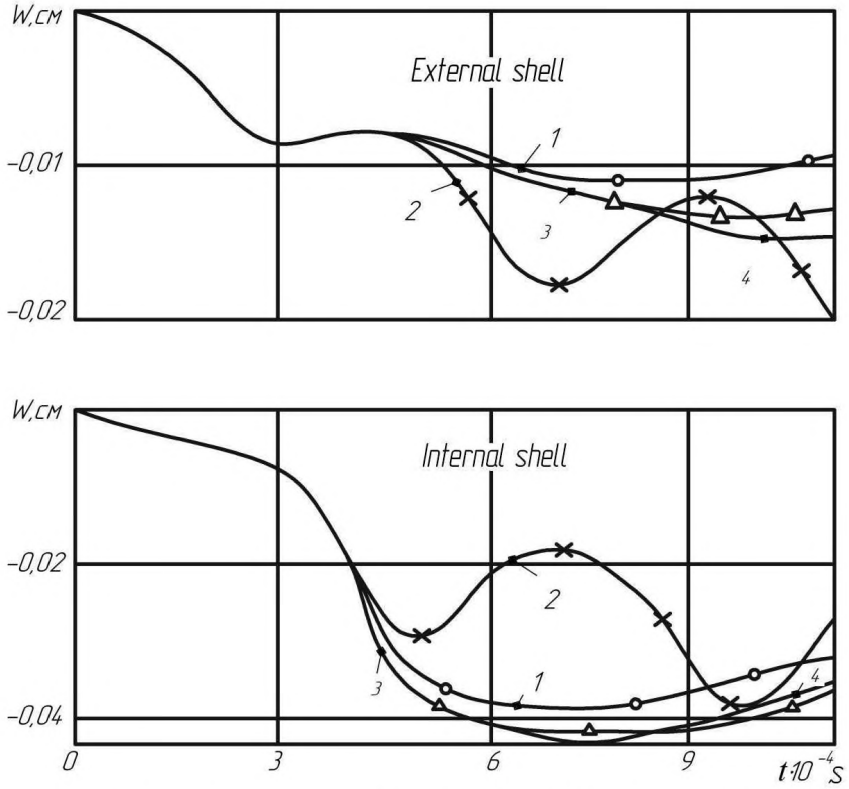

Fig.1 Sags of central points of shells (A=1MPa)

A series of numerical experiments have been conducted. After that, the received results were analyzed. Amplitudes of impulse loading P_n were taken to be equal to $1MPa$and $5MPa$, the duration of which was$\tau = 2{,}6\cdot10^{-4}$s.Let us note that calculations were also carried out for amplitudes of impulse external loading with other values. This gave the

opportunity to generalize the received results and to make some conclusions:in quite a wide range of values of functional impulse loading amplitude, the influence of cavitation, which appears, on the shells deformation is substantial. This shows that in such cases calculations should be carried out with a model, which includes the cavitation phenomenon.

In fig. 1 and fig. 2 curves, received for values A=1$MPa$and$A$=5MPa are analogous. This also gives the opportunity to make a conclusion: with the increase of external load amplitude, the influence of cavitation on the value of the maximum shell sag rises. So, at A = 1MPa for an external shell it is 20%, and for internal – 30%, and at A = 5MPa for an external shell - 32%, and for internal - 45%.

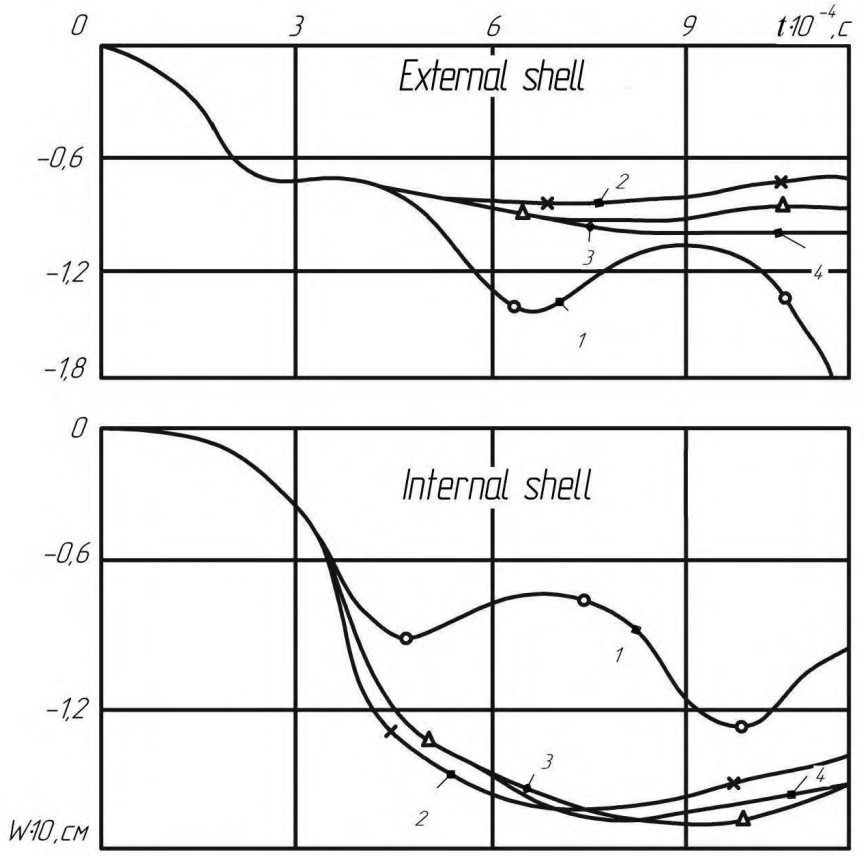

Fig 2 - Change of sags of central points of shells(A-5MPa)

List of references

1. Штефан Н.І., Телестакова В.В. // Динаміка співвісних циліндричних оболонок, заповнених бульбашковою рідиною / "Молодий вчений", 2018, №1(53), с.578-580;Url - http://molodyvcheny.in.ua/files/journal/2018/1/136.pd