

# EMISSION OF HYDROACOUSTICS NOISE OF SHIPS WITH ADJUSTMENT PROPELLER

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*In the present is furnished results of research of underwater emissions of disturbances in work by ship with adjustable propellers. Verification of level of noise emission was purpose of research dispose by shipping propellers depending on their. Noise have been presented from shipping propellers in background of noise from driving matches dating .*

## INTRODUCTION

Acquaintance of hydroacoustic field and it's characteristics supplies knowledge about sound level emission to water environment by shipping fix-ups. Hydroacoustic pressure level is changing in depend on work regimes of ship's fix-ups. Shipping propellers are characterized for water biggest dynamics of change of hydroacoustic pressure generated. Pressure changing in depend on corner of setup propeller payments of shipping screws and proficiency. Its conditions are changing in flow effect, but therefore, level and character of sound emission generated by shipping propeller.

### 1. THE METHOD OF THE RESEARCH

Hydroacoustic pressure measurements was perform for left apart and right driving match and for two driving matches working together. Ship was changing speed of its move during measurements. Change of move speed was obtained by propeller wings angle deflection. Driving matches turns had got constant rotary speed. Measuring hydrophones was receiving ship noises. They was lined in ship movement trajectory. Noises was recorded and analyzed be PULSE ver. 102 system. Ship obtained assumed parameters of wings angle deflection and its speed in distance from measuring hydrophones equal  $\pm 300$  m.

## 2. RESULTS

Results of different measurements variants are presented below. Results of right driving matches measurements are presented on fig.1.

Line 1 – hydroacoustic noise level ship,

Line 2 – noise level generated by driving match,

Line 3 - noise level generated by shipping propeller.

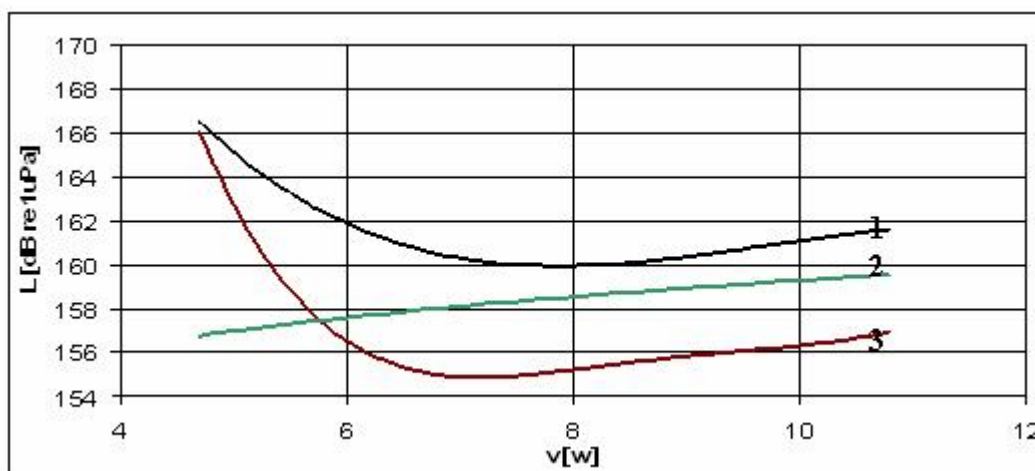


Fig.1. Dependence of noise level in function of move speed for right driving match. Constant turns of driving match. Variable propeller wings angle deflection

Results of left driving matches measurements are presented on fig. 2.

Line 1 – hydroacoustic noise level ship,

Line 2 – noise level generated by driving match,

Line 3 - noise level generated by shipping propeller.

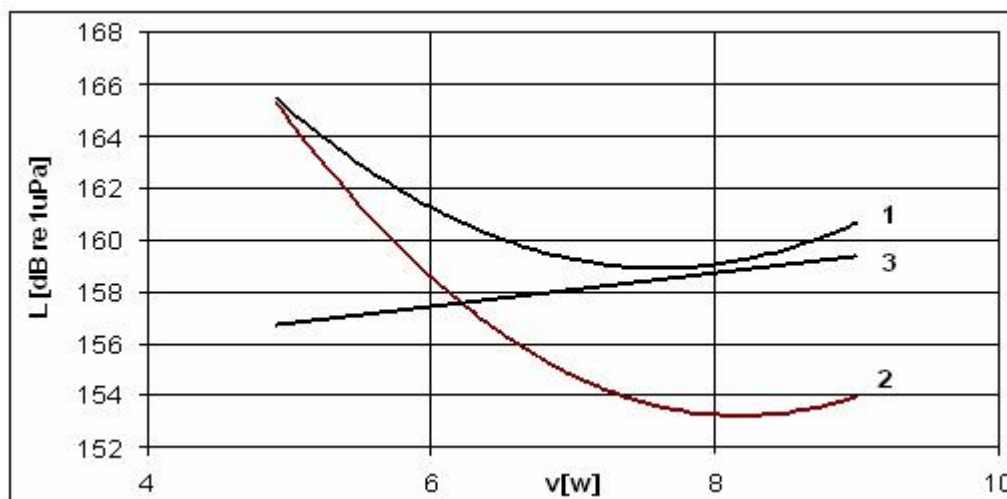
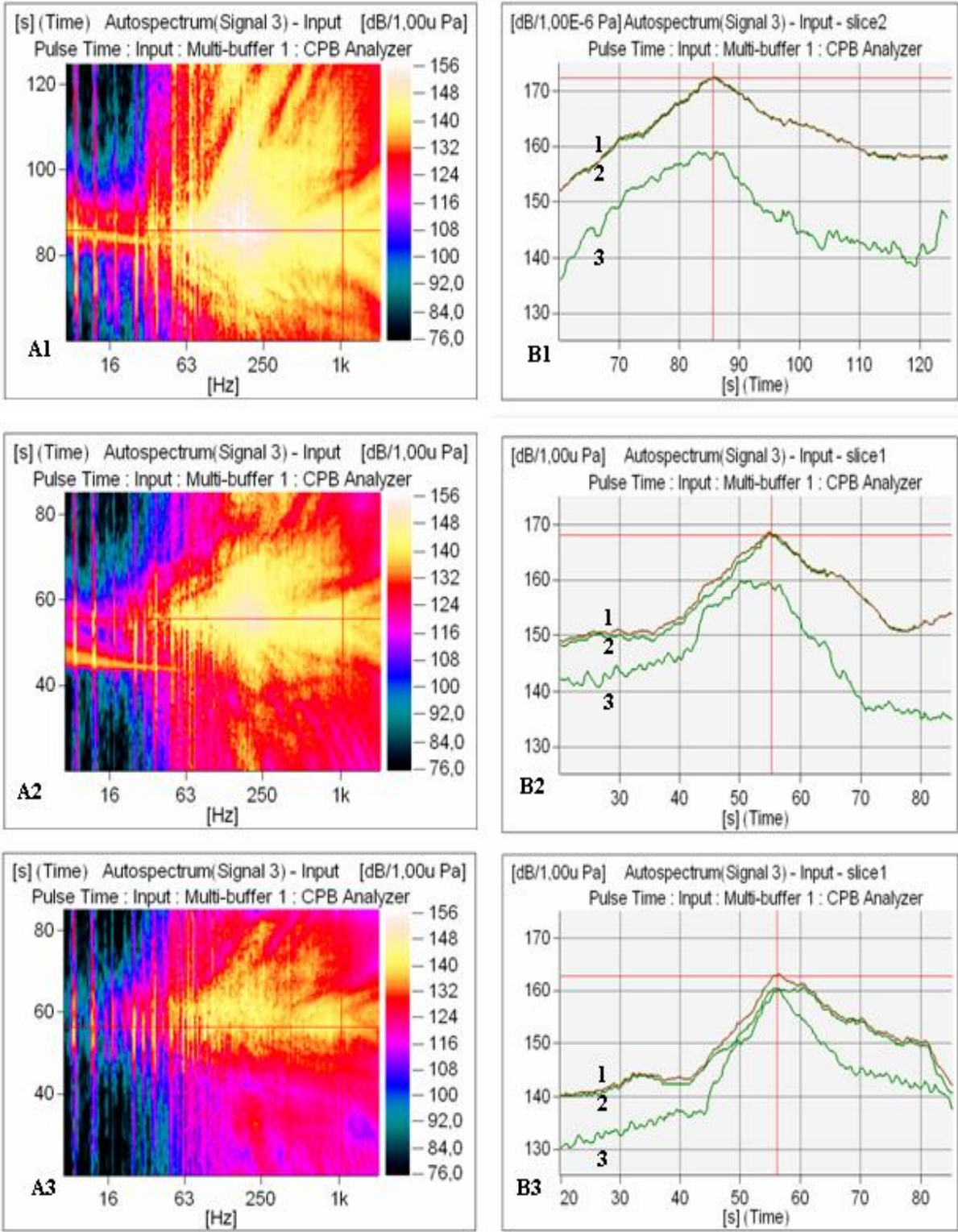


Fig.2. Dependence of noise level in function of move speed for left driving match. Constant turns of driving match. Variable propeller wings angle deflection

Results of noise measurements issued to water environment by two working driving matches are presented on fig. 3.



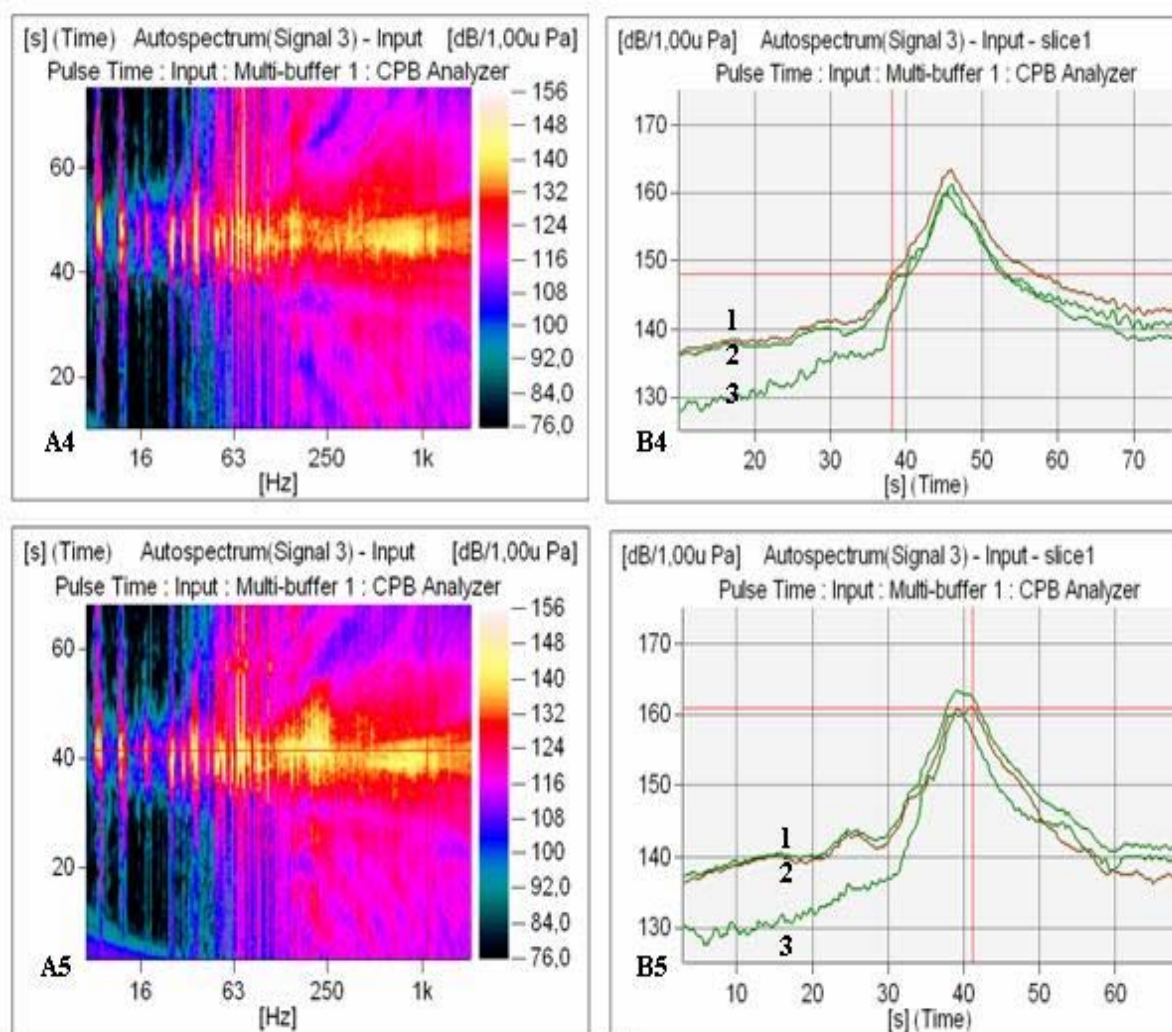


Fig.3. Dependence of noise level in function of different move speed for both driving matches. Constant turns of driving matches. Variable propeller wings angle deflection

Where spectrograms A1 - A5 are comply with appropriate speed movement:  
 A1 –  $v = 4,8[\text{kn}]$ ; A2 –  $v = 6,4[\text{kn}]$ ; A3 –  $v = 7,6[\text{kn}]$ ; A4 –  $v = 10,6[\text{kn}]$ ; A5 –  $v = 13[\text{kn}]$   
 Line 1 – hydroacoustic noise levels ship,  
 Line 2 – noise levels generated by driving match,  
 Line 3 - noise levels generated by shipping propeller.

Noise levels B1 – B5 are obtained from spectrograms A1 – A5 where:  
 Line 1 – RMS values of hydroacoustic pressure from ship  
 Line 2 - RMS values of hydroacoustic pressure from propellers  
 Line 3 - RMS values of hydroacoustic pressure from driving matches.

Spectrograms A1 – A5 present changes of acoustic pressure issued by ship to water in frequency domain and dependence of distance from measurements hydrophones.

Dependences of noise levels issued by ship with working two driving matches are presented on fig. 4.

- Line 1 – hydroacoustic noise level ship,
- Line 2 – noise level generated by driving matches,
- Line 3 - noise level generated by shipping propellers.

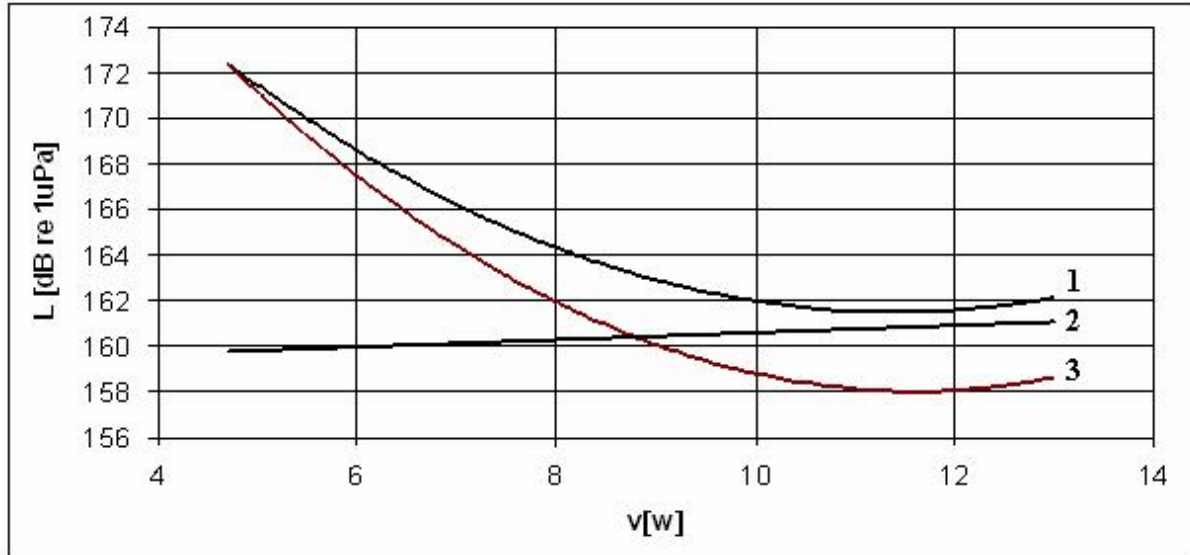


Fig.4. Dependence of noise level in function of move speed for both driving matches. Constant turns of driving matches. Variable propeller wings angle deflection

There is shown in table 1 maximum value of hydroacoustics noise levels during two driving matches working.

Moving speed [kn]	Nosie level [dB re 1µPa]		
	ship	propeller	driving match
4,8	173	173	160
6,4	168	168	160
7,6	163	160	160
10,6	163	160	161
13	163	161	161

Figure 1, 2 and 4 shows that process of acoustic pressure changing in dependence of moving speed related with wings angle deflection changing, are the same. It is possible to observe high level acoustic pressure at small ship's speed, where wings angle deflection determines it's small thrust and low proficiency.

### 3. CONCLUSIONS

In conducted investigations of noise issue by the ship to water environment results that in small moving speed range and preliminaries parameters of ship's fix-ups, the propeller has critical influence on hydroacoustic pressure level. When movement speed increases, then pressure level connected with driving matches working subtly increases. This phenomena is relevant with increasing it's strain by propeller. The time process of hydroacoustic pressure changing in dependence of wings angle deflection shows that in cases when is required small noise level in small speed range, there is advisable changing of main engines rotations with. It is possible to keep noise issue on the lowest level.

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