붐 안정화기구를 가진 모바일 하버용 크레인의 제안
Proposition of Crane for Mobile Harbor with Boom Stabilizing Function

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1. Introduction

About the structure, mobile harbor crane also has enough the basic functions of the conventional crane. In addition, the mobile harbor crane must overcome the effect of vibration of the big waves in the sea. Thus the stabilizers are important component for anti-vibration of the wave.

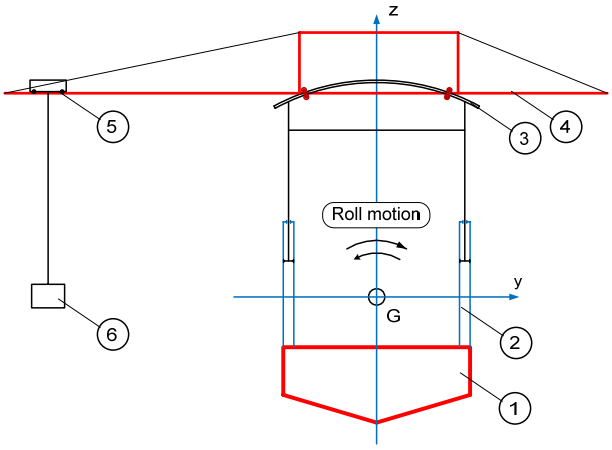
Most of ideas for stabilization of mobile harbor cranes in the world try to control directly to the independent legs of the mobile harbor which request a very large force of active actuator along with the complex control algorism. In this paper we propose a simple structure of mobile harbor crane to reduce the main action of the vibration following the roll axis of the mobile harbor ship.

2. WORKING PRINCIPLE OF PROPOSED MOBILE HARBOR CRANE

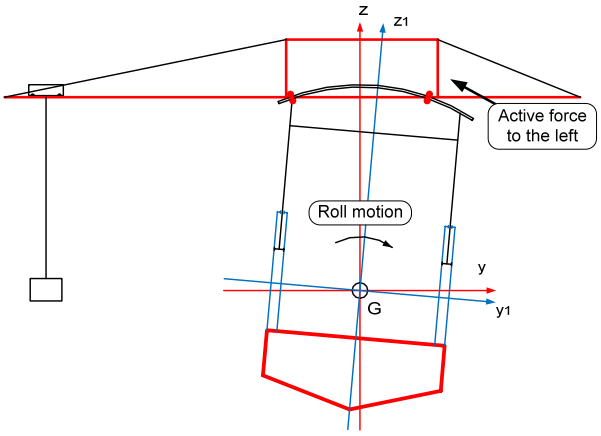
The working principle of the proposed mobile harbor crane is shown in Fig.1. The coordinate system Gyz and Gy_1z_1 are fixed to the boom (4) and support frame (2, 3) of the crane. Where the support frame of the crane is fixed to the ship (1) and G is the center of gravity.

In the action of waves, the roll motion which has its axis along the length of the ship is the main direction having the large effect. The system will have the vibration with the roll motion around the center of gravity G. With the arc form of guiding rail (3) the boom (4) will be stabilized when the ship (1) and the support frame (2, 3) roll together a round the center G. The stabilization are shown in Fig.1(b) and (c). In Fig.1(b) when the ship have the negative roll, the stabilizer will generates the active force to the left side which acting on the boom (4). The process is inverse direction for the positive roll of the ship as shown in Fig.1(c).

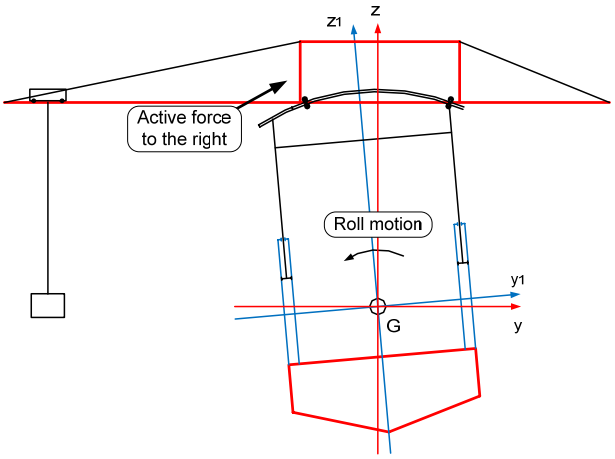
For generating the active force of the stabilizer, the hydraulic cylinder or electric motor is used. This crane also has enough the functions of the conventional crane.



(a) Neutral condition



(b) Negative roll



(c) Positive Roll

Fig.1 Working principle of proposed mobile harbor crane

3. 1st PROTOTYPE OF UOU CRANE FOR MOBILE HARBOR

For validation the proposed working principle of mobile harbor crane, its prototype is design and setup as shown in Fig.2, where the mount vibrator is used for the work of wave form generator following the roll axis.

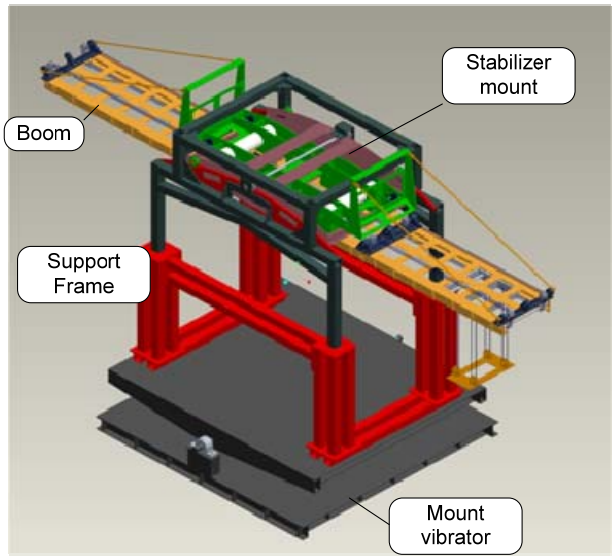


Fig.2 Prototype of UOU crane for mobile harbor

4. CONCLUSION

We proposed a simple working principle of mobile harbor crane. The prototype for validation this principle is also designed.

In the future, this prototype design will be fabricated and experimented with some control algorisms to validate our proposed idea.

REFERENCE

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