

EXPERIMENTAL STUDY OF DESTABILIZING FORCE IN CENTRIFUGAL COMPRESSOR IMPELLER

Hiroshi Kanki*

Kazuhiko Adachi**

Mitsutoshi Jyoutoku***

Dept. of Mechanical Engineering, Faculty of Engineering, Kobe University

Rokkodai 1-1, Nada-ku, Kobe 657-8501, Japan

Tel.: +81-78-803-6140 Fax: +81-78-803-6155

E-mail: *kanki@mech.kobe-u.ac.jp,

** kazuhiko@mech.kobe-u.ac.jp, ***jyoutoku@ma-2.mech.kobe-u.ac.jp

ABSTRACT

Subsynchronous vibration of centrifugal compressor is one of the important problems of rotating machinery. Many works have been continued for the problem. The stabilizing efforts in labyrinth seals and bearing are applied successfully, however, the destabilizing force in impeller has still many questions. Even in qualitative meaning the problem could not be fully solved.

Then, authors make a plan to solve this problem from the basic point of phenomenon. At first, the basic experimental model was developed to realize the subsynchronous vibration in laboratory. The experimental model is based on the experience of axial turbine model which solved stability problem of partial admission operation. The model is composed by two special parts. One is FRP impeller which has relatively large diameter and very light weight, the other is very slender rotor which gives low natural frequency and very small damping.

These designs will realize the subsynchronous vibration even in small power (7.5kw).

The excessive vibration due to low damping is solved by special designed amplitude limiter having small clearance and damper.

The development of the experimental model was completed and the operation is just started.

Keywords: Subsynchronous vibration, centrifugal compressor, impeller, experimental model