Synthesis Lectures on
Ocean Systems Engineering

SYNTHESIS
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Fidaa Karkori

Ship Vibration 3

Noise and Vibration Control for Inhabited Ships Spaces

Springer

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To me, the sea is a continual miracle; the fishes that swim, the rocks, the motion of the waves, the ships with men in them. What stranger miracles are there?

—Walt Whitman

For Zakaryah Maximilian

Preface

Working and living onboard vessels impose a series of generally low-frequency mechanical vibrations as well as single-impulse shock loads on the human body. Also, exposure to noise is characteristic aboard vessels. Low-frequency vibrations are created by vessel motions, which are produced by the various sea states in conjunction with vessel speed and point of sail. These motions can result in motion sickness, body instability, interruptions of task performance, sleep interruption and fatigue, increased health risk aggravated by shock loads due to slam, and reduced human efficiency.

Higher frequency vibration influences comfort and is often associated with rotating machinery. The imposition of higher frequency vibrations (about 1 to 80 Hz) induces corresponding motions and forces within the human body creating discomfort and reduced human efficiency. With regard to noise, the above can similarly affect exposed humans, notably with sleep interruption and resulting fatigue, discomfort, and reduced efficiency. Also of concern are transient and permanent hearing loss, masking of audible signals, and interruption of speech communication.

The concerns related to levels and characteristics of noise and vibration are covered in this and the first book related to habitability on ships and offshore structures. To be granted any of the associated habitability notations, specific noise and vibration criteria must be met. Ship designers in pursuit of these notations have requested guidance on how to control levels of noise and vibration in inhabited spaces. As a result, this guide has been written. The information presented in this book is intended for guidance only to support vessel designers and operators in controlling vessel noise and vibration in the general case, and more specifically in meeting the requirements of classification society habitability rules. Adherence to some or all of the guidance in this book affords no guarantee that a habitability notation will be granted.

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