

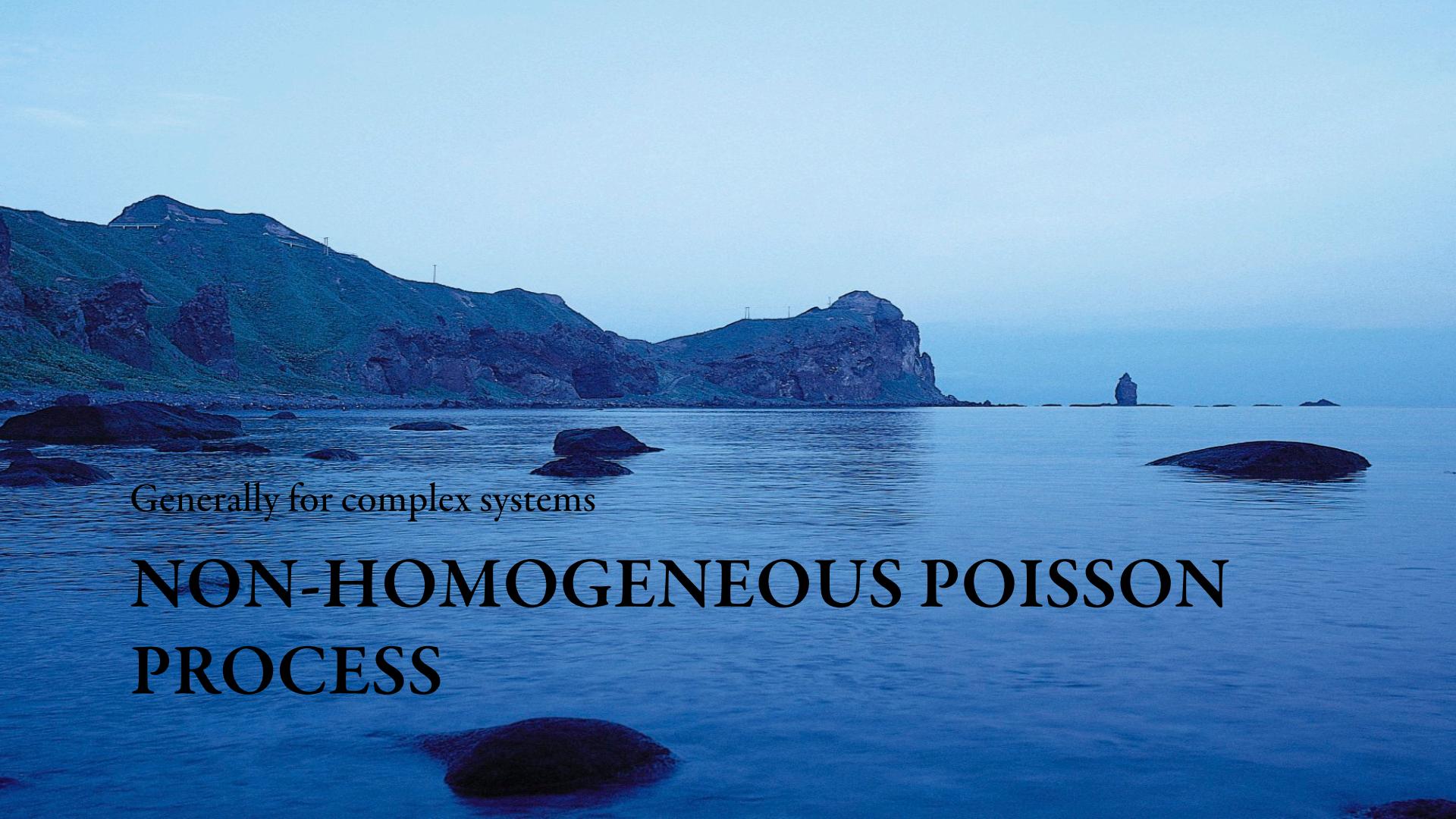


ASQ CRE Prep course

Lesson II. A. 4. c.

Poisson Process Models

Non-Homogeneous Poisson Process

A wide-angle photograph of a coastal scene at dusk or dawn. The sky is a deep, hazy blue. In the foreground, the dark blue ocean is dotted with several large, dark rocks. To the left, a large, rugged mountain rises, its slopes covered in green vegetation and rocky outcrops. A small bridge or causeway is visible on the mountain's side. In the middle ground, a prominent, dark, craggy rock formation juts out into the water. To the right, a small, isolated rock formation with a lighthouse on top stands in the distance. The overall atmosphere is serene and somewhat mysterious due to the low light.

Generally for complex systems

NON-HOMOGENEOUS POISSON PROCESS

Generalized NHPP

- Repairs do not fully restore to as new condition
- Operating times between repairs may not be independent or identically distributed

Models for Mean Repair Function

- **M(t) is the mean repair function**

$$M(t) = at^b$$

- **Power Model - linear on log-log paper**

$$M(t) = ae^{tb}$$

- **Exponential Model - linear on semi log paper**
- **Often we assume constant failure rate between repairs to use HPP**

Example

- **Let's say a system follows NHPP with**

$$M(t) = 0.002t^{1.3} \text{ for } t > 0$$

- **Find expected number of failures between 168 hrs and 672 hrs**

Example

- **Let's say a system follows NHPP with**

$$M(t) = 0.002t^{1.3} \text{ for } t > 0$$

$$M(672) - M(168)$$

$$0.002(672)^{1.3} - 0.002(168)^{1.3}$$

$$3.421 - 0.605 = 2.81$$

- **Find expected number of failures between 168 hrs and 672 hrs**

Is it appropriate to
assume constant
failure rates?



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Poisson Process Models

Mann Reverse Arrangement Test