

---

## Contents

<b>1</b>	<b>Introduction</b> .....	1
<b>2</b>	<b>Background on Coherent Systems</b> .....	7
2.1	Basic Ideas .....	7
2.2	The Reliability of a Coherent System .....	17
<b>3</b>	<b>System Signatures</b> .....	21
<b>4</b>	<b>Signature-Based Closure, Preservation and Characterization Theorems</b> .....	37
4.1	An Application to the IFR Closure Problem .....	37
4.2	Preservation Theorems Based on Signature Properties .....	43
4.3	An Application to Redundancy Comparisons .....	48
4.4	Signature-Based Characterizations of Relative System Performance .....	53
<b>5</b>	<b>Further Signature-Based Analysis of System Lifetimes</b> .....	59
5.1	An Application to Direct and Indirect Majority Systems .....	59
5.2	An Application to Consecutive $k$ -out-of- $n$ Systems .....	62
5.3	The Limiting Behavior of System Failure Rates and Survival Curves .....	65
5.4	Comparing Arbitrary Mixed Systems via Stochastic Precedence .....	68
<b>6</b>	<b>Applications of Signatures to Network Reliability</b> .....	75
6.1	An Introduction to Communication Networks .....	75
6.2	A Brief Look at Domination Theory .....	81
6.3	The Linkage Between Dominations and Signatures .....	83
<b>7</b>	<b>Applications of Signatures in Reliability Economics</b> .....	91
7.1	Prototypical Problems in Reliability Economics .....	91
7.2	Optimality Criteria .....	94

XII Contents

7.3	Characterizing Optimal Systems.....	98
7.4	Estimating the Relevant Characteristics of the Component Distribution .....	106
7.5	Approximately Optimal System Designs .....	114
7.6	Discussion .....	116
<b>8</b>	<b>Summary and Discussion .....</b>	<b>119</b>
8.1	Introduction .....	119
8.2	A Retrospective Overview .....	120
8.3	Desiderata.....	124
8.4	Some Additional Related Literature.....	128
8.5	Some Open Problems of Interest .....	131
8.5.1	The Ordering of Expected System Lifetimes .....	131
8.5.2	Other Preservation Results .....	131
8.5.3	The limiting monotonicity of $r_T(t)$ .....	132
8.5.4	Further Results on Stochastic Precedence.....	132
8.5.5	Uniformly Optimal Networks .....	133
8.5.6	Other Problems in Reliability Economics .....	135
8.5.7	Wholly New Stuff .....	137
	<b>References .....</b>	<b>139</b>
	<b>Index .....</b>	<b>145</b>



<http://www.springer.com/978-0-387-71796-8>

System Signatures and their Applications in  
Engineering Reliability

Samaniego, F.J.

2007, XII, 154 p. 13 illus., Hardcover

ISBN: 978-0-387-71796-8