Contents

Introduction		5
1. The linear time - branching time spectrum		17
1. Semantic equivalences on labelled transition systems	22	
2. The semantic lattice	38	
3. Complete axiomatizations	50	
2. Modular specifications in process algebra - with curious queues	• •	55
1. Module logic	61	-
2. Process algebra	66	
3. Applications of the module approach in process algebra	80	
4. Queues	89	
5. A protocol verification	102	
Appendix: Logics	111	
3. Branching time and abstraction in bisimulation semantics		117
1. Branching and abstraction	120	
2. Axioms	130	
3. Branches and traces	143	
4. Completeness proofs	149	
5. Correspondence	158	
6. Refinement	159	
7. Divergence	163	
8. Modal characterizations	164	
4. Refinement of actions in causality based models		173
1. Refinement of actions in prime event structures	181	
2. Refinement of actions in flow event structures	186	
3. Configuration structures and refinement of actions	193	
4. Refinement of transitions in Petri nets	197	
5. Partial order semantics for refinement of actions - neither necessary		
nor always sufficient but appropriate when used with care -	2	213
6. Equivalence notions for concurrent systems and refinement of actions		223
1. Interleaving semantics	225	
2. Step semantics	227	
3. 'Linear time' partial order semantics	230	
4. 'Branching time' partial order semantics	231	
7. The refinement theorem for ST-bisimulation semantics		243
1. Concurrent systems and refinement of actions	247	
2. The behaviour of concurrent systems I	249	
3. Equivalence notions for concurrent systems I	250	
4. The behaviour of concurrent systems II	255	
5. Equivalence notions for concurrent systems II	257	
6. The refinement theorems	265	
References		73