LIST OF CONTENTS

PREFA	CE	5
PRINC	IPLES OF BENCHMARKING	
1	Verification and validation of computer simulations	9
2	Some thoughts on bench-marking studies in the context of fire and smoke modelling	17
FUNDA	AMENTAL BENCHMARK CASES	
3	Validation of computer programs for Eurocode level 3-methods	23
4	Steel beams	30
5	Elastic-plastic bending of beams	41
6	Benchmark study of lateral torsional-buckling of class 4 steel plate girders under fire	
	conditions: numerical comparison	72
7	Local buckling of class 4 section beams	84
8	Simple steel structures	92
9	Composite beams	102
10	Simple composite beams	112
11	Simply supported side-plated RC beam	122
12	Steel columns under temperature gradient	133
13	Creep analysis of steel columns with different heating rates	144
14	Thermo-mechanical analysis of steel columns using different finite element types	
	and constitutive laws	156
15	Thermo-mechanical analysis of steel columns using different constitutive law	170
16	Simplified and advanced calculation methods for composite columns in fire	182
17	Buckling of concrete columns	196
18	Composite slabs	208
19	Collapse behaviour of concrete slab floor system	223
20	Cold-formed steel portal frames at elevated temperatures	230
21	Software covering steel frame structural behaviour	245

COMPLEX BENCHMARK CASES

22 Structural fire engineering benchmarking of columns and space-frames using Vulcan and Safir

255

23	The influence of joint modelling on fire behaviour of steel frame structure	270
24	Critical temperature of steel frame with joint flexibility increasing in fire- Benchmark	
	study prepared for the environment of Autodesk Robot structural analysis	281
25	Charring of timber - Verification of numerical model	308
26	Reference cases for the validation of people evacuation software used in Germany	315
INDEX	OF AUTHORS	325
ACTIO	N MEMBERS	327