



**2 Motor-vehicle safety**

- 2 Safety systems
- 4 Basics of vehicle operation

**12 Basic principles of vehicle dynamics**

- 12 Tires
- 15 Forces acting on a vehicle
- 22 Dynamics of linear motion
- 24 Dynamics of lateral motion
- 26 Definitions

**28 Car braking systems**

- 28 Overview
- 30 History of the brake
- 36 Classification of car braking systems
- 38 Components of a car braking system
- 39 Brake-circuit configuration

**40 Car braking-system components**

- 40 Overview
- 41 Brake pedal
- 42 Brake servo unit
- 47 Master cylinder
- 49 Brake-fluid reservoir
- 49 Pilot-pressure valve
- 50 Components for braking-force distribution
- 54 Brake pipes
- 54 Brake hoses
- 55 Brake fluid

**56 Wheel brakes**

- 56 Overview
- 58 Drum brakes
- 64 Disk brakes
- 70 Brake pads, shoes and disks

**74 Antilock braking system (ABS)**

- 74 System overview
- 76 Requirements placed on ABS
- 77 Dynamics of a braked wheel
- 78 ABS control loop
- 82 Typical control cycles
- 90 Wheel-speed sensors

**94 Traction control system (TCS)**

- 94 Tasks
- 94 Function description
- 96 Structure of traction control system (TCS)
- 97 Typical control situations

- 98 Traction control system (TCS) for four wheel drive vehicles

**102 Electronic stability program (ESP)**

- 102 Requirements
- 103 Tasks and method of operation
- 104 Maneuvers
- 112 Closed-loop control system and controlled variables
- 118 Micromechanical yaw-rate sensors
- 120 Steering-wheel-angle sensors
- 122 Hall-effect acceleration sensors

**124 Automatic brake functions**

- 124 Overview
- 126 Standard function
- 128 Additional functions

**134 Hydraulic modulator**

- 134 Development history
- 135 Design
- 138 Pressure modulation

**142 Sensors for brake control**

- 142 Automotive applications
- 144 Wheel-speed sensors
- 148 Hall-effect acceleration sensors
- 150 Micromechanical yaw-rate sensors
- 152 Steering-wheel-angle sensors

**154 Sensotronic brake control (SBC)**

- 154 Purpose and function
- 156 Design
- 156 Method of operation

**158 Active steering**

- 158 Purpose
- 158 Design
- 160 Method of operation
- 161 Safety concept
- 161 Benefits of active steering for the driver

**162 Occupant protection systems**

- 162 Vehicle safety
- 162 Seat belts, seat belt pretensioners
- 164 Front airbag
- 167 Side airbag
- 168 Components
- 171 Rollover protection systems

- 172 Outlook
- 175 Piezoelectric acceleration sensors
- 176 Surface micromechanical acceleration sensors
- 178 Seat occupancy sensing

### **180 Driving assistance systems**

- 180 Critical driving situations
- 180 Accident causes, measures
- 181 Application areas
- 181 Safety and convenience
- 183 Electronic all-around visibility

### **186 Adaptive cruise control (ACC)**

- 186 System overview
- 189 Ranging radar
- 197 ACC sensor and control unit
- 204 Composite system
- 210 Control and display
- 214 Detection and object selection
- 220 ACC control
- 227 Further developments

### **230 Parking systems**

- 230 Parking aid with ultrasonic sensors

- 233 Further development
- 234 Ultrasonic sensors

### **236 Instrumentation**

- 236 Information and communication areas
- 236 Driver information systems
- 238 Instrument clusters
- 240 Display types

### **242 Orientation methods**

- 242 Orientation
- 242 Position-finding
- 242 Navigation

### **246 Navigation systems**

- 246 Assignment
- 246 Application
- 246 Method of operation
- 252 Piezoelectric tuning-fork yaw-rate sensor

### **254 Workshop technology**

- 254 Workshop business
- 258 Diagnostics in the workshop
- 260 Testing equipment
- 262 Brake testing

Brakes, Brake Control and Driver Assistance Systems  
Function, Regulation and Components

Reif, K. (Ed.)

2014, VIII, 275 p. 306 illus. in color., Softcover

ISBN: 978-3-658-03977-6