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1.0 UNDERWATER ACOUSTICS AND ACOUSTICAL OCEANOGRAPHY

- **1.1 Acoustical oceanography**
- **1.2 Bioacoustics**
- **1.3 Broadband acoustics**
- **1.4 Acoustic transducers**
- **1.5 Sonars**
  - 1.5.1 Multibeam
  - 1.5.2 Sidescan
- **1.6 Sound propagation and scattering**
  - 1.6.1 Boundary interaction
  - 1.6.2 Shallow water propagation
  - 1.6.3 Deep water propagation
- **1.7 Acoustic modeling**
- **1.8 Seismo-acoustics**
- **1.9 Ocean noise**
- **1.10 Signal coherence and fluctuation**
- **1.11 Other underwater acoustics and acoustical oceanography**

2.0 SONAR SIGNAL / IMAGE PROCESSING AND COMMUNICATION

- **2.1 Sonar signal processing**
  - 2.1.1 Detection, classification, localization
  - 2.1.2 Time reversal techniques
  - 2.1.3 Wavelet methods
  - 2.1.4 Time – frequency
  - 2.1.5 Parametric signal processing (AR, ARMA, MA, etc.)
- **2.2 Array signal processing and array design**
  - 2.2.1 Adaptive beamforming
  - 2.2.2 Reduced rank methods
  - 2.2.3 Subspace methods
  - 2.2.4 Array element localization
- **2.3 Model-based signal processing techniques**
  - 2.3.1 Matched field processing
  - 2.3.2 Physics-based signal processing
  - 2.3.3 Kalman filtering
  - 2.3.4 Particle filtering
- **2.4 Vector sensor processing**
- **2.5 Synthetic aperture (active and passive)**
- **2.6 Classification and pattern recognition (parametric and non-parametric)**
- **2.7 Sonar imaging**
  - 2.7.1 Image processing and reconstruction
  - 2.7.2 Tomographic imaging
- **2.8 Acoustic telemetry and communication**
  - 2.8.1 Equalization
  - 2.8.2 Packet identification
- **2.9 Distributed Systems and Sensor Processing**
- **2.10 Acoustic tracking, localization, and data fusion**
- **2.11 Biologically inspired processing**
- **2.12 Other sonar signal / image processing and communication**

3.0 OCEAN OBSERVING PLATFORMS, SYSTEMS, AND INSTRUMENTATION

- **3.1 Vehicles**
  - 3.1.1 AUV, UUV, UMV, USV
  - 3.1.2 ROV
  - 3.1.3 Other platforms
- **3.2 Automatic control**
- **3.3 Buoy technology**
  - 3.3.1 Moorings
  - 3.3.2 Ropes and tension members
- **3.4 Integrated ocean observatories (IOO)**
  - 3.4.1 Submarine cables and connectors
  - 3.4.2 Acoustic telemetry
- **3.5 Oceanographic instrumentation**
  - 3.5.1 Current measurement technology
    - 3.5.1.1 HF radar for coastal current observing
    - 3.5.1.2 Floats and gliders
  - 3.5.2 Chemical and physical property sensors
  - 3.5.3 Distributed sensors and networks
  - 3.5.4 New sensor technology
- **3.6 Biomimetics**
- **3.7 Other ocean observing platforms, systems, and instrumentation**

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4.0 AIR AND SPACE OCEAN REMOTE SENSING
- **4.1 Air / sea interaction**
- **4.2 Lidar**
- **4.3 Passive observing sensors**
- **4.4 Coastal radars**
- **4.5 Ocean color and hyperspectral measurements**
- **4.6 Airborne and satellite radar and SAR**
- **4.7 Operational observation**
- **4.8 Sensor synergy**
- **4.9 Space systems**
- **4.10 Other air and space ocean remote sensing**

5.0 OCEAN DATA VISUALIZATION, MODELING, AND INFORMATION MANAGEMENT
- **5.1 Data visualization**
- **5.2 Data fusion**
- **5.3 Data assimilation and prediction**
- **5.4 Data compression**
  - 5.4.1 Archival technologies
  - 5.4.2 Standards
- **5.5 Ocean modeling, simulation, and validation**
- **5.6 Information processing**
- **5.7 Marine Geographical Information Systems (GIS)**
- **5.8 Displays**
  - 5.8.1 Miniaturization
  - 5.8.2 User interfaces and ergonomics
  - 5.8.3 Holographic displays
- **5.9 Other ocean data visualization, modeling, and information management**

6.0 MARINE ENVIRONMENT, OCEANOGRAPHY, AND METEOROLOGY
- **6.1 Marine environmental modeling**
- **6.2 Hydrodynamics**
- **6.3 Oceanography: physical, geological, chemical, biological**
- **6.4 Hydrography**
- **6.5 Seafloor mapping**
- **6.6 Marine geology and geophysics**
- **6.7 Marine geodesy**
- **6.8 Marine life and ecosystems**
  - 6.8.1 Environmental monitoring
  - 6.8.2 Observational tools
  - 6.8.3 Living marine resources
  - 6.8.4 Ecological impact and management
- **6.9 Meteorology**
- **6.10 Pollution monitoring**
- **6.11 Other marine environment, oceanography, and meteorology**

7.0 OPTICS, IMAGING, AND E-M SYSTEMS
- **7.1 Optics**
  - 7.1.1 Imaging
    - 7.1.1.1 Image formation
    - 7.1.1.2 Computer vision and pattern recognition
    - 7.1.1.3 Image fusion
  - 7.1.2 Optical properties of water
  - 7.1.3 Radiative transfer and modeling
  - 7.1.4 Optical sensors
    - 7.1.4.1 Adaptive optics
    - 7.1.4.2 Bio-optics
    - 7.1.4.3 Optical technologies
  - 7.1.5 Performance sensitivity
  - 7.1.6 Boundary analysis
- **7.2 Electric and magnetic sensing**
- **7.3 Novel applications of underwater imaging**
- **7.4 Other optics, imaging, and E-M systems**

8.0 MARINE LAW, POLICY, MANAGEMENT, AND EDUCATION
- **8.1 Coastal zone management**
- **8.2 Ocean economic potential**
- **8.3 Marine law and policy**
- **8.4 Environmental protection**
- **8.5 Marine safety**
- **8.6 International issues**
- **8.7 Ocean resources**
  - 8.7.1 Fisheries
  - 8.7.2 Minerals
  - 8.7.3 Storage and disposal
- **8.8 Marine education and outreach**
- **8.9 Ocean exploration**
- **8.10 Other marine law, policy, management, and education**

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9.0 OFFSHORE STRUCTURES AND TECHNOLOGY

- **9.1 Ocean energy**
- **9.2 Submarine cables and connectors**
- **9.3 Buoys, moorings, ropes, and tension members**
- **9.4 Offshore structures**
- **9.5 Mechanical engineering and materials science**
- **9.6 Naval architecture**
  - 9.6.1 Ship design and operation
  - 9.6.2 Dynamic positioning
  - 9.6.3 Other naval architecture
- **9.7 Marine salvage, pollution clean-up, and pollution remediation**
- **9.8 Diving**
- **9.9 Naval mines (active and passive)**
- **9.10 Deep water field development technology**
- **9.11 Seafloor engineering**
- **9.12 Other offshore structures and technology**

10.0 LOCAL VENUE TOPICS

- **10.1 Ocean mapping and marine archaeology**
- **10.2 Aquaculture engineering**
- **10.3 Arctic ocean science**
- **10.4 Marine mammal classification**

11.0 TOPICAL SUBJECTS

- **11.1 Tsunami warning systems**
- **11.2 Hurricane flood and other damage mitigation**
- **11.3 Disaster and catastrophe management**
- **11.4 Risk assessment and planning**
- **11.5 Global Earth Observing System of Systems (GEOSS)**
  - 11.5.1 Integrated Ocean Observing System (IOOS)
- **11.6 Homeland security**
  - 11.6.1 Maritime domain awareness
  - 11.6.2 Sensor and detection technology
    - 11.6.2.1 Detection of explosives
    - 11.6.2.2 Detection of biological and chemical threats
    - 11.6.2.3 Special sensors for threat detection and intervention
    - 11.6.2.4 Diver hand-held sonar equipment
  - 11.6.3 Threat detection, pre-emption, and disruption technologies
  - 11.6.4 Swimmer and diver detection and engagement
  - 11.6.5 Harbor entrance barrier technologies
  - 11.6.6 Port, harbor, and shoreline surveillance and protection
  - 11.6.7 Environmental data bases of non-threat conditions
  - 11.6.8 Underwater and air/water observation and surveillance

12.0 OTHER

- **12.1 Other**