

2.5. PRESSURE MONITORING ND SAFETY SYSTEMS

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Introduction. This paper investigates the scope of ND pressure monitoring in: anti-terrorists diagnostics, protection of the premises, life and goods from the unauthorized access; humanitarian safety; and other safety systems and aspects. Possible applications include: pressurized suits (aeronautics and space exploration, biological and chemical protection, diving), pressurized chambers and rooms (laboratories, pressurized biological or chemical chambers, safe boxes and vaults, protected premises), as well as pressurized apparatus and pipe or duct systems which should be monitored for reasons of humanitarian safety.

Basic results. As opposed to optical, thermal vision and other similar methods and means for search and surveillance, the pressure monitoring and safety systems are unknown to the terrorist groups and practically undetectable prior to their activation.

The safety systems based on ND pressure monitoring could be generally classified as (fig. 1):

- By the way pressure in the protected area is maintained for the purpose of the ND pressure monitoring as: passive or active pressure monitoring systems;
- By the level of the monitored pressure as atmospheric or gauge pressure (forced) systems;
- By the way the pressure is spatially distributed in the protected domain as: homogeneous or non-homogeneous;
- By the way the pressure changes with time as: steady-state or dynamic.

In the first group the existing (atmospheric) pressure in the protected enclosure (suit, room, etc.) is monitored by the sensitive pressure measuring system to detect various events including opening or breaking of doors, windows or unauthorized movement of objects. In the forced pressure method the protected enclosure is slightly over- or under-pressurized in respect to the atmospheric pressure. Then the pressure measuring system is

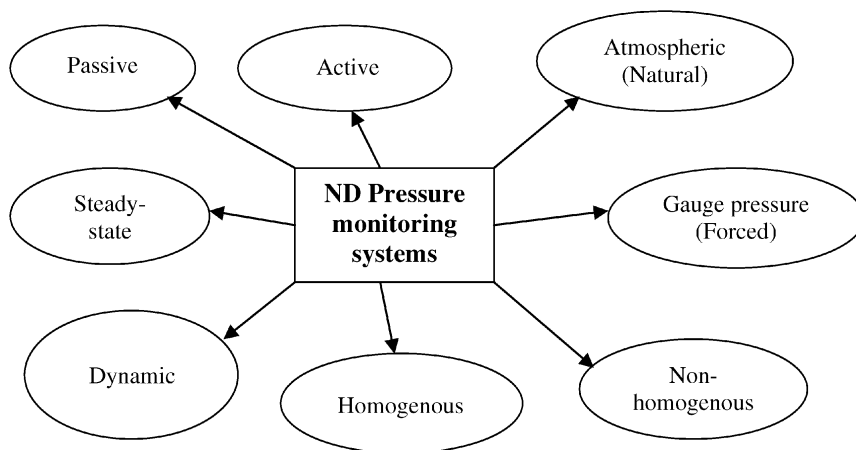


Fig. 1. Classification of ND Pressure Monitoring systems

used to detect changes of pressure which could be associated with safety threatening events. The pressure levels, the spatial distribution of pressure and the pressure dynamics give way to further classifications and the application possibilities.

The scope of the method will be described in detail with emphasis on various pressure monitoring systems and their performances in the possible areas of use. the scope of chosen methods will be demonstrated by measurement examples and the measurement uncertainty estimations.

Summary: besides being practically unknown to terrorists the ND pressure monitoring in humanitarian and other safety systems has several other advantages:

- The pressure disturbance is sensed by single transducer placed anywhere in the domain;
- the pressure field is invisible;
- the maintenance of pressure field is simple and low-cost;
- the obvious pressure medium (air) is free and readily available;
- other gases (as nitrogen or argon) can be applied serving also other purposes;
- simple ND pressure monitoring in transportation by means of battery powered pressure transducer/monitor.

The variety of methodologies utilizing different modes of pressure maintenance, its behavior in time, spatial distribution and level of pressure enable safety system design suitable for specific applications as: active or passive, steady-state or dynamic, homogeneous or non-homogeneous and natural or forced.