Congreso de Métodos Numéricos en Ingeniería (CMN2017)
3–5 de julio de 2017, Valencia, España

ACTIVE MATERIALS: MODELING AND APPLICATIONS

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Key words: Active materials, Computational modeling, Sensors/Actuators, Optimal design

ABSTRACT

In Physics every cause has an effect. In classical materials (also called passive materials) one effect is generated by one cause. On the contrary, the main characteristic of Active Materials (AM) is their ability to couple four fields: mechanic, thermal, electric and magnetic. Consequently, one effect can be due to one or more causes. This ability permits to design smart devices that are used in many modern applications such as sensors/actuators in civil engineering, smart structures in aeronautics, medical devices, energy harvesting devices, etc. Notice that the global market for AM was 26.0 USD billion in 2014 and will be about 42.0 USD billion in 2019.

For this reason, studies on computational modeling of AM and also on their applications are very important challenges for the Computational Mechanics community. In this spirit, the objective of the present minisymposium is to provide an overview of the new advances in modeling and applications of AM. It aims to include, but is not limited to, the computational and mathematical treatment of problems such as:

- Modeling AM using numerical methods as finite element, boundary element, etc
- Beam, plate, and shell models for AM
- Optimal designs of smart devices such as sensors/actuators, etc.
- Reliability and sensitivity analyses
- Inverse problems