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Professeur **Boris GRALAK** (Université de Marseille, France) donnera une conférence sur le thème:

« Frequency dispersion in electromagnetism »

Abstract: Frequency dispersion plays a central role in electromagnetism, and many applications in optics are based on its engineering. The basic principles (inertia, causality, passivity) creating and governing frequency dispersion in standard optical media will be presented. Then, the vital role of frequency dispersion in metamaterials will be shown, notably in the cases of the flat lens and invisible systems. Several models of frequency dispersive permittivity will be given, including an extended version of Kramers-Kronig relations and an effective medium description of a multilayered system.

In the second part, an augmented formulation of Maxwell equations [A. Tip, *Linear absorptive dielectrics*, Phys. Rev. A **57** (1998)] will be introduced in order to transform the time-dependent and non-selfadjoint Maxwell operator (with frequency dispersion) into a time-independent and selfadjoint augmented operator. In addition, a simple frequency linearization procedure, leading to a time-independent but non-selfadjoint operator, will be considered. This linearization has been implemented in the finite element method, and the computation of complex band structures will be shown for 2D photonic crystals made of Drude metal rods. Finally, the modal analysis of wave propagation in dispersive media will be presented, leading to a revisited version of Sommerfeld precursor.

Lausanne, le 23 avril 2018 BD/HMN/MM

Les séminaires qui ont lieu à la Section de Mathématiques sont annoncés sur Internet http://memento.epfl.ch/maths/