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Microwave Spectrometry for the Assessment of the Structural Integrity and Restenosis Degree of Coronary Stents GIANLUCA ARAUZ-GAROFALO, VICTOR LOPEZ-DOMINGUEZ, ANTONI GARCIA-SANTIAGO, JAVIER TEJADA, Grup de Magnetisme, Departament de Fisica Fonamental, Facultat de Fisica, Universitat de Barcelona, JOAN M. O'CALLAGHAN, Department Signal Theory and Communications, Universitat Politecnica de Catalunya, ORIOL RODRIGUEZ-LEOR, ANTONI BAYES-GENIS, Servei de Cardiologia, Hospital Universitari Germans Trias i Pujol, GMAG TEAM, HUGTP TEAM, UPC TEAM
— Cardiovascular disease is the main cause of death worldwide. Coronary stents are one of the most important improvements to reduce deaths from cardiovascular disorders. Stents are prosthetic tube-shaped devices which are used to rehabilitate obstructed arteries. Despite their obvious advantages, reocclusion occurs in some cases arising from restenosis or structural distortions, so stented patients require chronic monitoring (involving invasive or ionizing procedures). We study microwave scattering spectra (between 2.0 - 18.0 GHz) of metallic stents in open air, showing that they behave like dipole antennas in terms of microwave scattering. They exhibit characteristic resonant frequencies in their microwave absorbance spectra that are univocally related to their length and diameter. This fact allows one to detect stent fractures or collapses. We also investigate the "dielectric shift" in the frequency of the resonances mentioned above due to the presence of different fluids along the stent lumen. This shift could give us information about the restenosis degree of implanted stents.

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