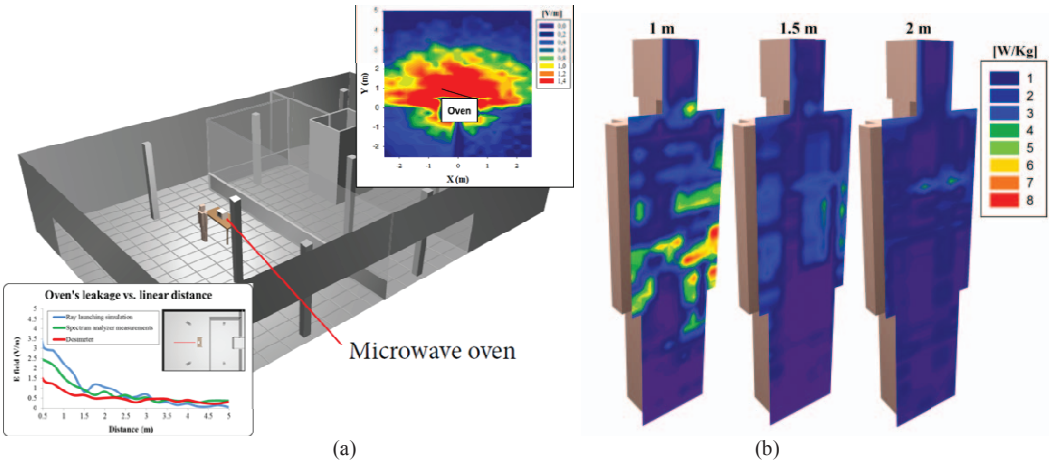
Dosimetric Assessment of Radiofrequency Power Leakage from Microwave Ovens in Complex Scenarios

Peio Lopez-Iturri[1], Silvia de Miguel-Bilbao[2], Erik Aguirre[1], Leire Azpilicueta[1], Victoria Ramos[2] and Francisco Falcone[1]*
[1]Electrical and Electronic Engineering Dept., Universidad Pública de Navarra, Spain, http://csm.unavarra.es
[2]Telemedicine and eHealth Research Unit, Health Institute Carlos III, Madrid, Spain

Despite the ubiquity of technologies using Radio Frequencies (RF), concerns arise in relation with the exposure from different RF sources and their relative impact on human health. National governments and health authorities have adopted measures to prevent and minimize risks associated to electromagnetic field (EMF) exposure. In this work, the EMF leakage levels of nonionizing radiation from a microwave oven for the complete volume of a complex indoor scenario have been estimated by using a hybrid simulation approach, combining full wave simulation coupled with an in-house developed 3D ray launching code. The results confirm that exposure levels are strongly dependent on the location of the source as well as on the topology and morphology of the indoor scenario. Furthermore, the introduction of an in-house developed simplified human body model for ray launching simulations allows obtaining initial estimations of SAR values, which can be employed in order to analyze compliance with different regulations. This technique allows performing assessment of exposure levels in complete scenarios, with feasible computational cost, aiding in the adoption of exposure reduction measurements, such as the identification of the optimal location of potential radiofrequency emitting sources, such as microwave ovens. This analysis in the future can be extended to other types of devices, such as household appliances or industrial equipment.



(a) (b)

Figure 1. (a) Schematic view of the considered scenario with insets showing simulation results. (b) Estimation of SAR on the human body model for 1m, 1.5m and 2m distance from the oven.