MMP analysis of plasmonic structures in layered media: a review

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Layered media are one of the most important building blocks in electromagnetics, regardless of the wavelength range. In the microwave regime, layered media and their salient physical properties are used extensively when building antennas, transmission lines and waveguides. Following the improvements in the fabrication process of structures having geometrical features comparable with the visible spectrum, several nano devices built in layered media are realized and became the new hot topics of the electromagnetic society, including optical antennas, bio-chemical sensors waveguides, etc. As a result of this interest, it has been quite important and desirable to have a robust and efficient numerical method that can analyze nano-plasmonic structures in layered media. For this purpose, layered media Green's functions that are used in the analysis of structures in the microwave range for decades is updated (by including the dispersive and plasmonic nature of metals in optics) and combined with the Multiple Multipole Program (MMP). As a result, a robust and efficient numerical method that can handle the 2D and 3D scattering and eigenvalue analyses of plasmonic structures, built in layered media, is obtained. In this talk, this method will be reviewed with several numerical examples and discussions.