

TIME-HARMONIC ELECTRO-MAGNETIC SCATTERING IN EXTERIOR WEAK LIPSCHITZ DOMAINS

ABSTRACT. We will talk about the weak solution theory for the time-harmonic electro-magnetic radiation problem governed by Maxwells equations

$$\begin{aligned} -\operatorname{rot} H + i\omega\varepsilon E &= F & \text{in } \Omega, & & E \times n &= 0 & \text{on } \Gamma_1, \\ \operatorname{rot} E + i\omega\mu H &= G & \text{in } \Omega, & & H \times n &= 0 & \text{on } \Gamma_2, \end{aligned}$$

for the physically interesting case $\omega \in \mathbb{R} \setminus \{0\}$. Here $\Omega \subset \mathbb{R}^3$ is an exterior weak Lipschitz domain with boundary Γ decomposed into two disjoint parts Γ_1 and Γ_2 . Therefore it is necessary to use the framework of polynomially weighted Sobolev spaces. Using the principle of limiting absorption introduced by Eidus in the 1960's, we will show a Fredholm alternative to hold. The necessary a priori-estimate and polynomial decay of eigenfunctions for the Maxwell equations will be obtained by transferring well known results for the Helmholtz equation using a suitable decomposition of the fields E and H . The crucial point for existence is a local version of Weck's selection theorem, also called Maxwell compactness property.