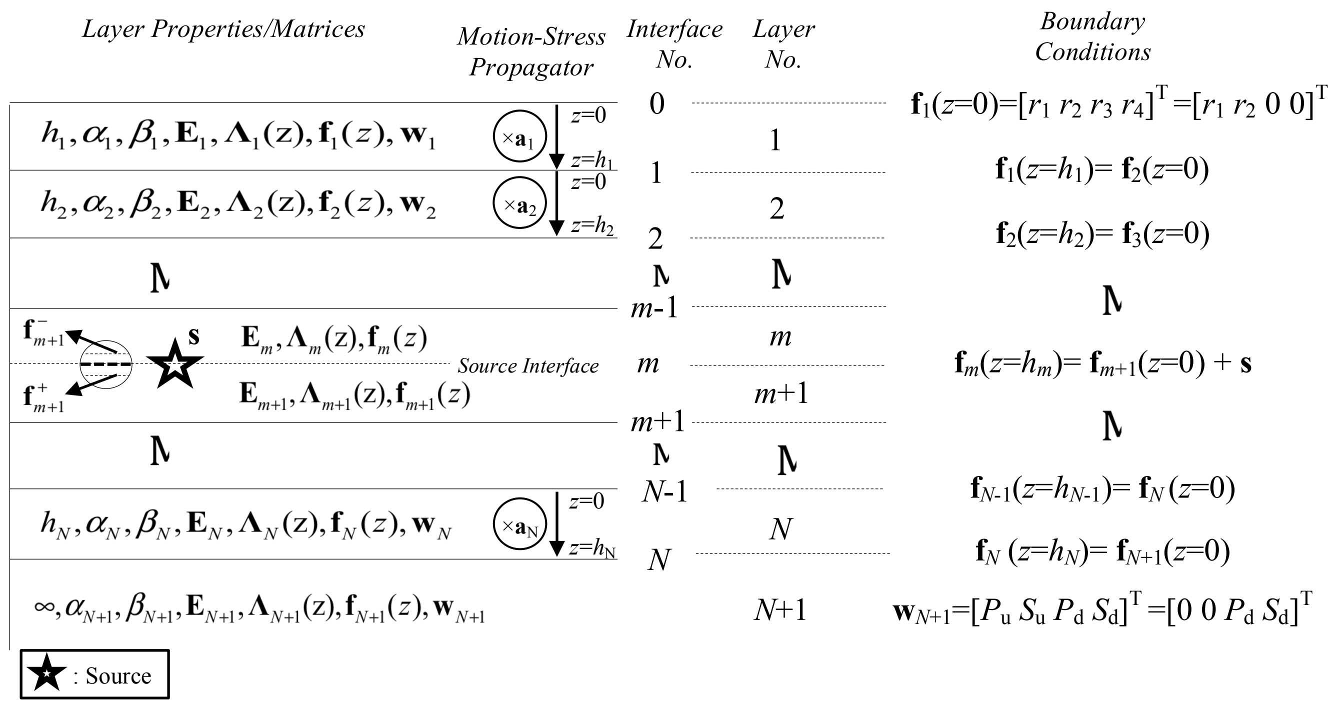

Figure 2.3. Heterogeneous system along with its associated matrices. Each layer has some matrices related to it and among them the motion-stress vector, and wave-vector ($\mathbf{f}(z)$ and $\mathbf{w}$) are unknown. These two unknowns are related to each other using Equation (2.38). Therefore, if one starts from the surface with unknown surface displacements, one can transfer it to the bottom of the first layer by multiplying it with the transfer matrix $\mathbf{a}_1$. Then, from the first interface condition, it is possible to determine the $\mathbf{f}(z)$ at the top of the second layer as a function of unknown displacements at the surface, and then transfer it to the bottom of layer two by multiplying $\mathbf{f}(z)$ with the transfer matrix $\mathbf{a}_2$. By now, one has the dependency of surface displacements with the first and second layer properties, and by repeating the same process down to the half-space, one actually have found the dependency of surface perturbations to the properties of a multilayered medium, and can extract dispersive properties of the medium. If in such calculations, one encounters and accounts for the existence of a source of energy at the m^{th} interface (as shown), then one