

Technology Whitepaper

High Flexibility by Subchannels (x-Domain)

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An electromagnetic field enters the master channels of a component through the master channel regions (see [Connecting Solvers by Master Channels](#)). Outside of the master region the light is absorbed or passes the channel.

With VirtualLab Fusion version 2021.1 we have started to enable the optional decomposition of a master region into subregions in x-domain which form the entrance to subchannels. Any lateral decomposition of the master region should be enabled by channel mask data or a programmable algorithm. In version 2021.1 we use this concept for the first time for the Microlens Array component. In this case the surface consists of an array of lenses, and it is consequent to consider the lenses as individual channels. Since the periodic surface of a lens array has all information for the definition of the subregions, the channels are introduced via the option *Surface Related* as shown in Fig. 1.

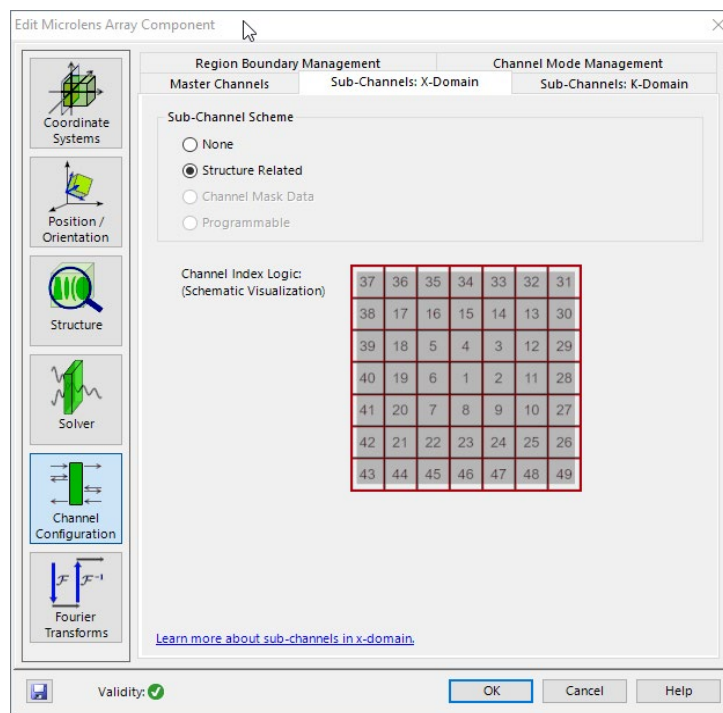


Fig. 1: VirtualLab Fusion enables the decomposition of the master channel into subchannels, e.g., for the modeling of a microlens array.

The subchannels have a well-defined channel index which enables to address them specifically. Figure 2 shows the *Channel Mode Management* tab. Currently VirtualLab Fusion offers the modeling of all subchannels or one channel with selected index. In combination with the Parameter Run any selection of subchannels can be modeled.

By using the subchannels in the example of a microlens array, the diffraction effects at the boundary of each lens can be accurately modeled. If this is not critical, e.g., in case of the use of a microlens array for light shaping, the introduction of subchannels can be skipped. VirtualLab Fusion deals with the contributions of all lenses together in one field, which is typically faster than modeling a lot of subchannels. Thus, the two options have pros and cons, and its use depends on the application.

The concept of subchannels in the x-domain will be introduced for more components, e.g., for lens-type diffusers and flat lenses, like diffractive lenses, metalenses, and Fresnel lenses. Then, we apply the option to use different solvers in different channels. For the microlens array the same solver is applied per lens.

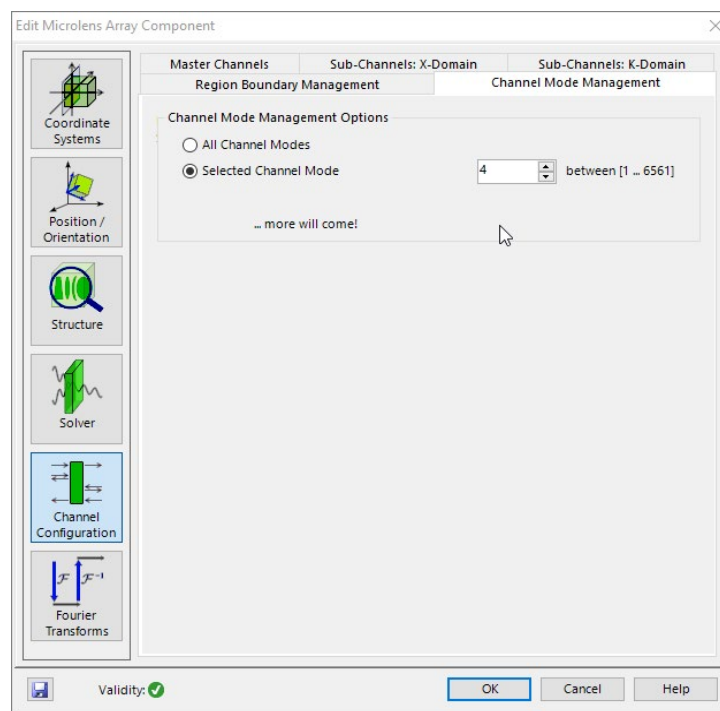


Fig. 2: VirtualLab Fusion offers the modeling of all subchannels or one channel with selected index per run of the system modeling.