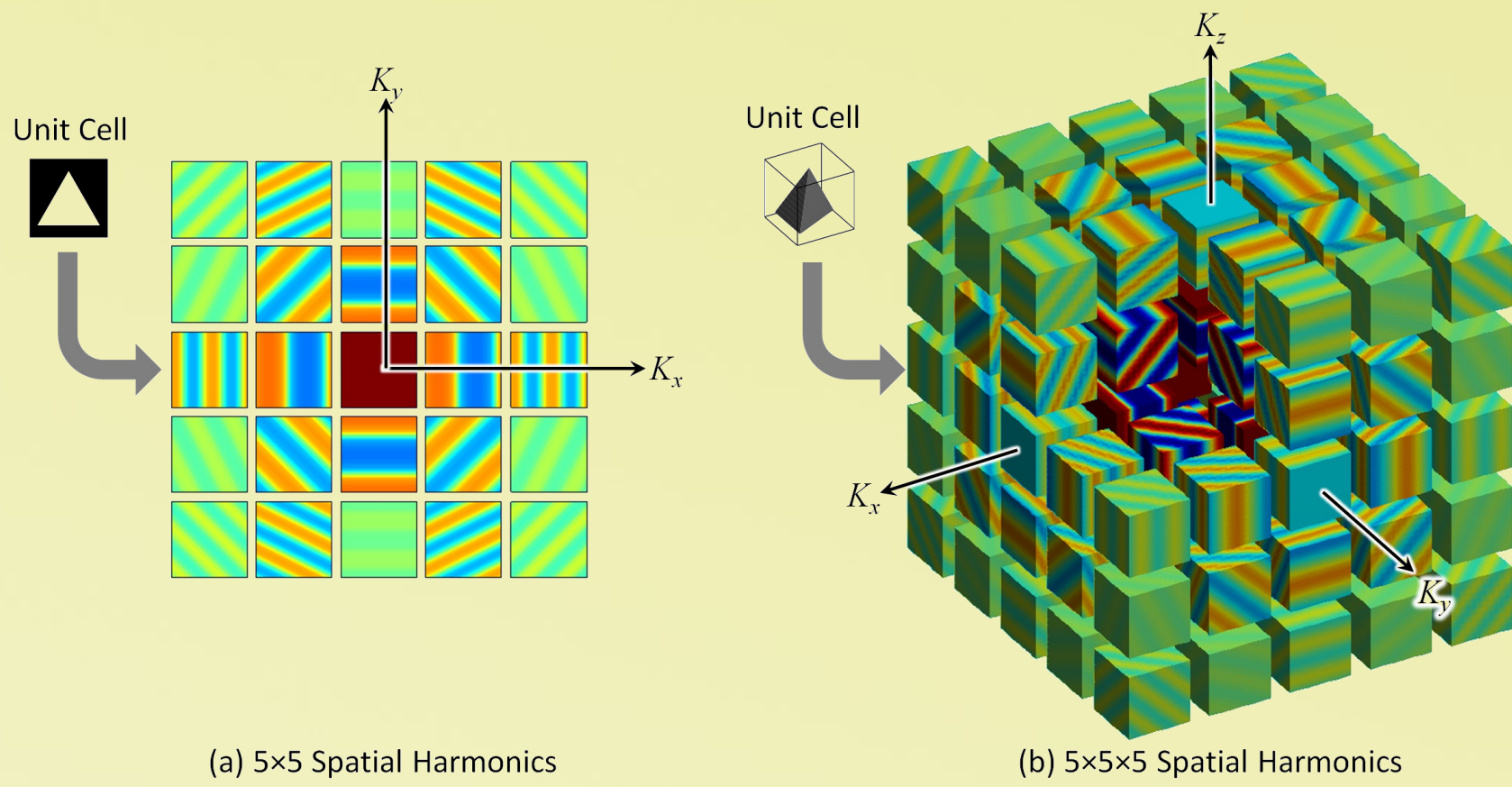


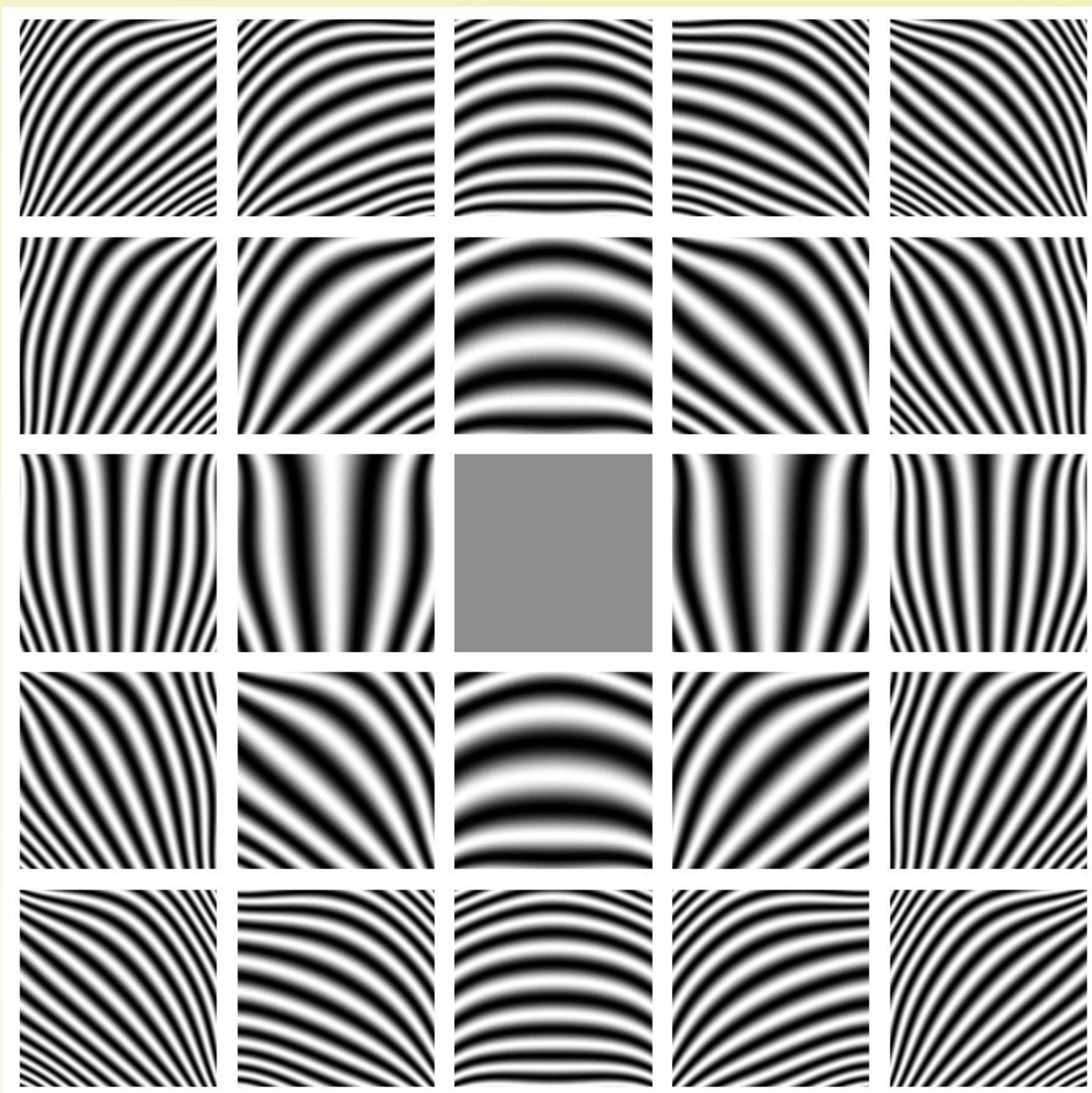
# Synthesis of Spatially Variant Lattices

The EM Lab has developed a unique and powerful tool to spatially vary any attribute of a periodic structure while leaving the overall lattice smooth and continuous. Attributes include unit cell orientation, lattice spacing, fill fraction, material composition, geometry, and more. The tool can be used to functionally grade metamaterials, exploit directional phenomena, develop multi-functional structures, and more.

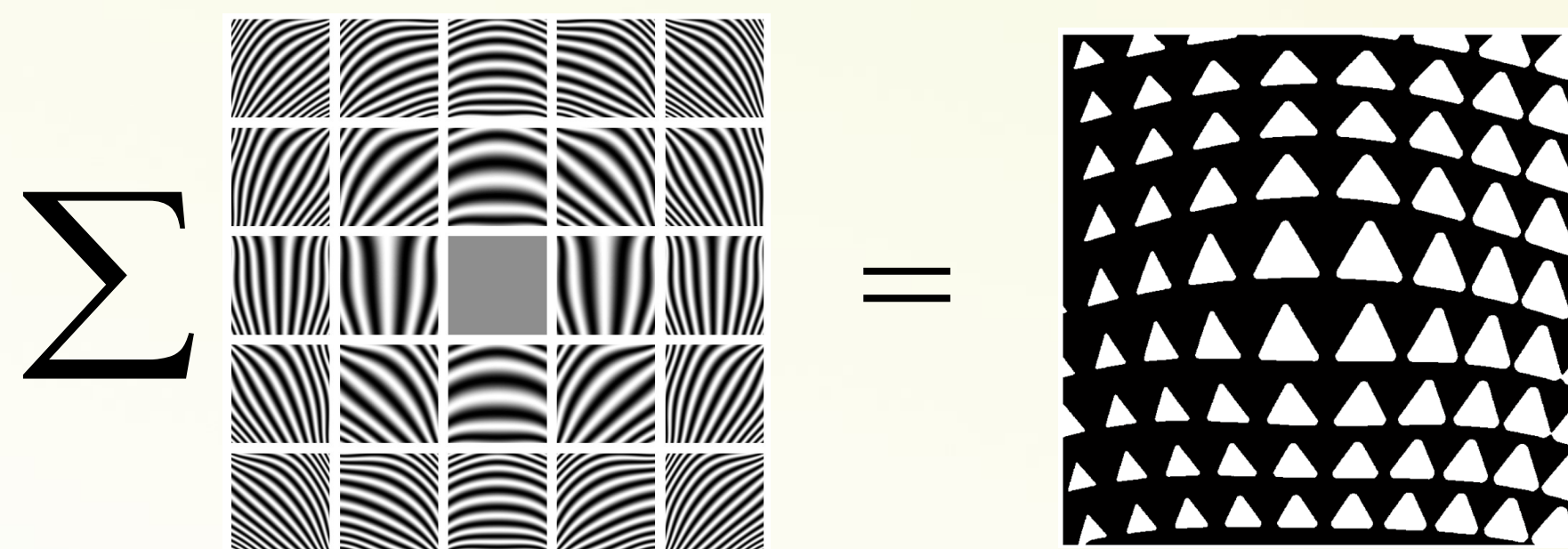
## 1. Decompose Unit Cell into Spatial Harmonics



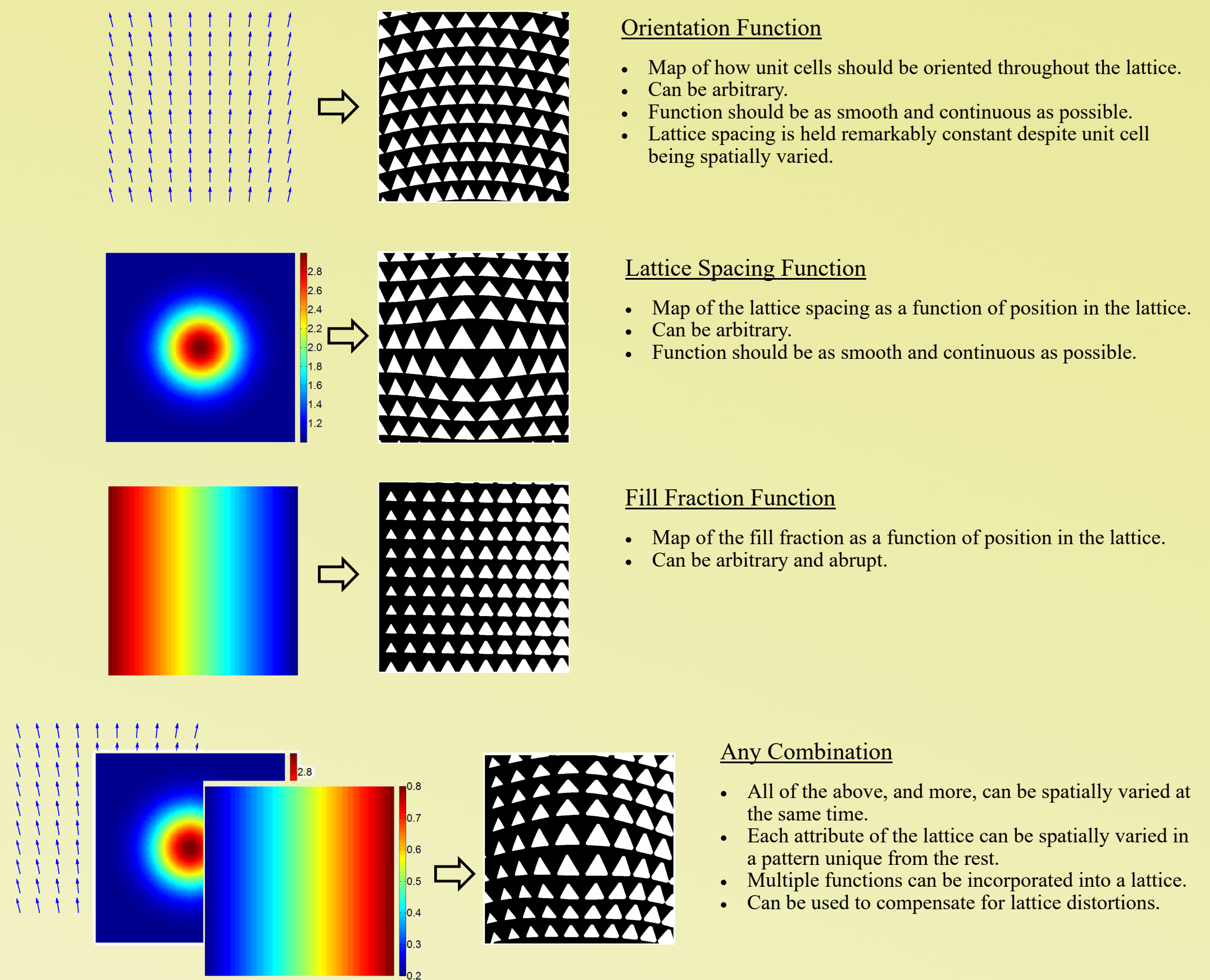
## 2. Spatially Vary Each Harmonic Separately



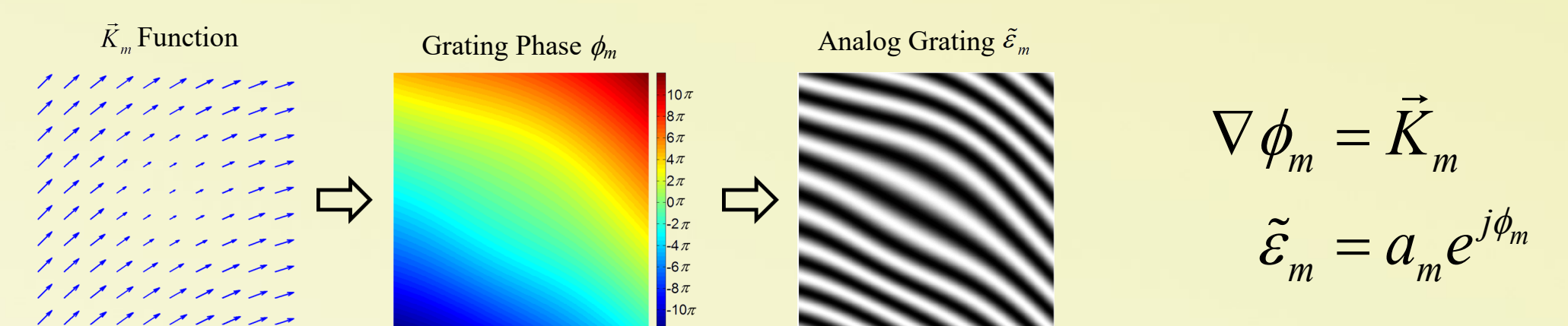
## 3. Add Above Results



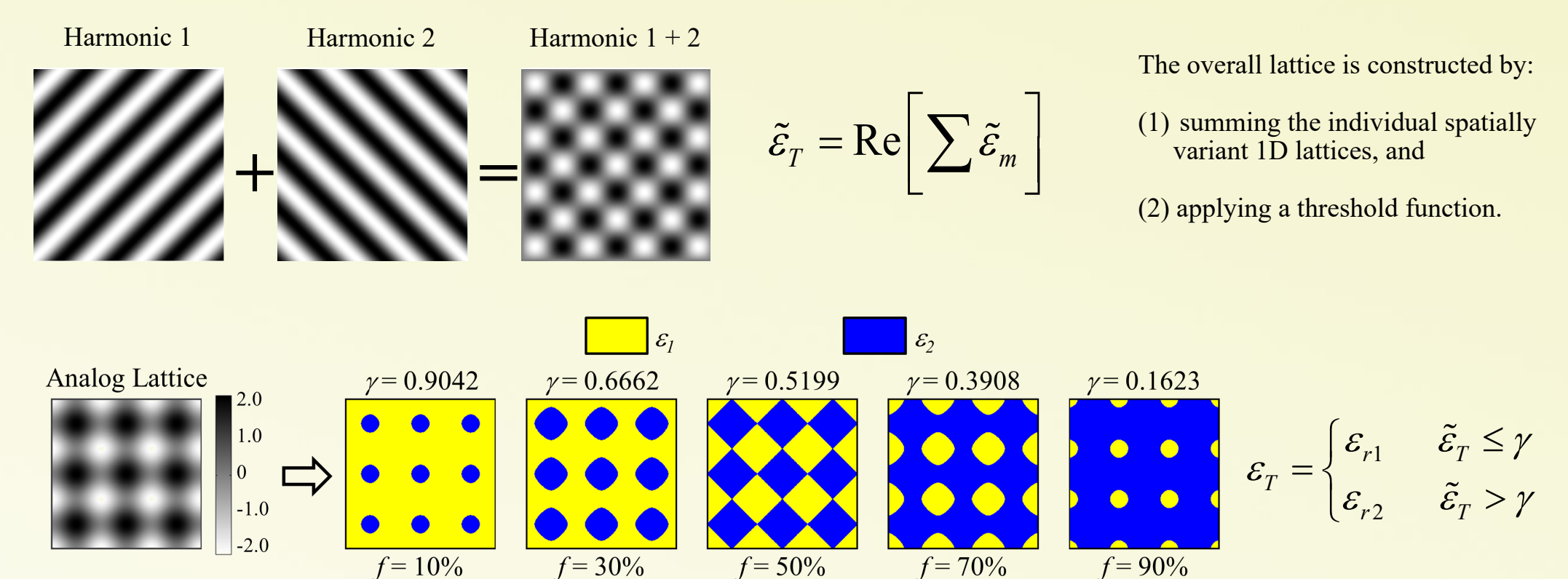
## INPUT TO SYNTHESIS ALGORITHM



## PROCEDURE FOR $m^{\text{th}}$ HARMONIC



## CONSTRUCTING THE OVERALL LATTICE



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