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LIST OF ABBREVIATIONS

Abbreviation	Full Form
EM	Electromagnetic
GHz	Gigahertz
TE	Transverse Electric
TM	Transverse Magnetic
PCB	Printed Circuit Board
HFSS	High Frequency Simulation Software
CST	Computer Simulation Technology
ADS	Advanced Design Systems
MS	Metasurface
MTM	Metamaterial
MSA	Metasurface Antenna
2D	Two-Dimensional
3D	Three-Dimensional
AMC	Artificial Magnetic Conductor
EBG	Electromagnetic Band Gap
FSS	Frequency Selective Surface
HIS	High Impedance Surface
PEC	Perfect Electric Conductor
PMC	Perfect Magnetic Conductor
DPS	Double Positive
ENG	Epsilon Negative

Abbreviation	Full Form
MNG	Mu-Negative
DNG	Double-Negative
ENZ	Epsilon-near-zero
MNZ	Mu-near-zero
ZIM	Zero-Index Materials
CPW	Coplanar Waveguide
FP	Fabry-Perot
CSR	Complementary Spiral Ring Resonator
EHL	Embedded Hilbert Line
MED-WG-MTM	Magneto-electro-dielectric waveguided MTM
PRS	Partially Reflected Surface
AIS	Artificial Impedance Surface
RCS	Radar Cross Section
CAMS	Checkerboard-organized Metamaterial Superstrate
VNA	Vector Network Analyzer
SLL	Side Lobe Level
SRR	Split Ring Resonator
Tx	Transmitter
Rx	Receiver

LIST OF SYMBOLS

Symbol	Details
N	Numbers of cells
P	Periodicity
β_{SW}	Propagation constant of surface wave resonances
L_{MS}	The overall length of the MS structure
β_{TM}	Propagation constants of TM-wave
β_{TE}	Propagation constants of TE-wave
η	Intrinsic Impedance
ε_0	Permittivity in free space
ε_r	Relative permittivity
μ_0	Permeability of free space
μ_r	Relative permeability
β	Phase change experienced by the wave
k_0	Wavenumber
n	Refractive index
E	Electric field
H	Magnetic field
J	Surface current density
c	Speed of light in air
λ_0	Free-space wavelength

Symbol	**Details**
Z	Equivalent Impedance
θ	Angle of Incidence
E_i	Resultant of the reflected field vectors
i	Transmitted wave index
E_0	Amplitude of the electromagnetic wave
f	Frequency
z	Normalized Impedance
h	Bottom and top layer distance
d	Maximum length of the unit cell
W	Width of the Microstripline
t	Thickness of the substrate
S_{11}	Reflection coefficient
S_{21}	Transmission coefficient
v	Normal incidence angle
Ω	Ohm
L	Inductance
C	Capacitance
L_p	Equivalent Inductance of the patch
C_p	Equivalent Capacitance of the patch
C_g	Ground Capacitance
L_{eq}	Effective Inductance
C_{eq}	Effective Capacitance

Symbol	Details
φ_s	Reflection phases of MS Layer
φ_g	Reflection phases of the ground layer
R_m	Radiation resistance of the metasurface resonator
L_m	Inductance values of the MS slot resonator
C_m	Capacitance values of the MS slot resonator
C_{cm1}	Coupling capacitance along the vertical directions of the MS layer
C_{cm2}	Coupling capacitance along the horizontal directions of the MS layer