

■ Section 3.2: Expressing isotropic medium using the Hodge operator for a Lorentz metric

```
In[1]:= SetDirectory["~/writing/WIP/KappaLib/"];  
<< kappaLib.m  
KappaLib v1.1
```

```
In[3]:= AA = -eps IdentityMatrix[3];  
BB = 1 / mu IdentityMatrix[3];  
CC = 0 IdentityMatrix[3];  
DD = CC;
```

```
kappa = emABCDToKappa[AA, BB, CC, DD];
```

■ Express medium using the Hodge operator

```
In[8]:= kappa2 = Sqrt[eps/mu] emHodge[DiagonalMatrix[{-1 / (eps mu), 1, 1, 1}]];
```

```
In[9]:= Simplify[Union[Flatten[kappa2 - kappa]], {eps > 0, mu > 0}]
```

```
Out[9]= {0, 0, 0, 0, 0}
```

■ Extra: Compute Tamm-Rubilar tensor density for this kappa

```
In[10]:= Simplify[emKappaToFresnel[kappa, {xi0, xi1, xi2, xi3}]]
```

```
Out[10]= - 
$$\frac{\text{eps} \left( -\text{eps} \mu \text{xi0}^2 + \text{xi1}^2 + \text{xi2}^2 + \text{xi3}^2 \right)^2}{\mu^2}$$

```