## Creating and Transforming a Second-Rank Antisymmetric Field Tensor $F^{\alpha \beta}$ using

## Mathematica

Hee-Joong Yun ${ }^{1}$
College of Techno-Sciences, Mokwon University, Daejeon 35349, Korea ${ }^{\text {a) }}$
(Received 6 August 2014)
List of figure for the paper.

PACS numbers: 07.05.Tp, 41.20.Jb, 03.50.De, 02.70.-C
Keywords: Polarization mode platform, Mathematica Simulation, Jones vector, Polarizer, Helicity

[^0]
## I. LIST OF FIGURE

Figure 1: Manipulate of fields, $\overrightarrow{E_{1}}$ and $\overrightarrow{E_{2}}$ in Eq. (33) observed at the point $P$ in $K$ frame as a function of time(vt).

Figure 2: Manipulating platform visualizing whiskbroom pattern of the electric fields. While change the control parameters(b,t, $\beta, \psi, \gamma$ ) platform presents different patterns. Autorun platform while clicking $\oplus$ top right .

Figure 3: Electric fields observed at the setup parameters values1 : values1 =\{ $c=1, \gamma=3, q=1, \beta=0.4032, b=0.1319, t=0.1123\}$, (a) from the setup values1, (b) by change of $b \rightarrow 0.4713$ and $\beta \rightarrow 0.4013$ from values1 (c) by change of $b \rightarrow 0.6714$ only (d) by change of $t \rightarrow 1.1123 \times 10^{-5}$ only.

Figure 4: Particle of charge $q$ moving at constant velocity $\vec{v}$ passes an observation point $P$ at impact parameter b .

Figure 5: Snapshots of whiskbroom pattern, those are lines of electric fields for a particle of the motion near the $\beta=0.4100$ along to $x^{1}$ axis in $\mathrm{K}^{\prime}$ frame. The patterns are snapped from the shiskbroom platform (Fig.2) at various $\beta$ values.

## II. FIGURES




FIG. 1. Manipulate of fields, $\vec{E}_{1}$ and $\vec{E}_{2}$ in Eq.(33) observed at the point $P$ in K frame as a function of time(vt).


FIG. 2. Manipulating platform visualizing whiskbroom pattern of the electric fields. While change the control parameters(b,t, $\beta, \psi, \gamma)$ platform presents different patterns. Autorun platform while clicking $\oplus$ top right .


FIG. 3. Electric fields observed at the setup parameters values1: values $1=\{c=1, \gamma=3, q=$ $1, \beta=0.4032, b=0.1319, t=0.1123\}$, (a) from the setup parameters values1, (b) by change of $b \rightarrow 0.4713$ and $\beta \rightarrow 0.4013$ from values1, (c) by change of $b \rightarrow 0.6714$ only (d) by change of $t \rightarrow 1.1123 \times 10^{-5}$ only.


FIG. 4. Particle of charge $q$ moving at constant velocity $\vec{v}$ passes an observation point $P$ at impact parameter b.


FIG. 5. Snapshots of whiskbroom pattern, those are lines of electric fields for a particle of the motion near the $\beta=0.4100$ along to $x^{1}$ axis in $\mathrm{K}^{\prime}$ frame. The patterns are snapped from the shiskbroom platform (Fig.2) at various $\beta$ values.


[^0]:    ${ }^{\text {a) }}$ Electronic mail: heejy@mokwon.ac.kr

