Checking Maths for $\mathcal{V}^{\mathrm{ab}}$

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The equation for $\mathcal{V}^{\mathrm{ab}}$ for normal incidence in the xy plane is given by

$$\begin{aligned}\mathcal{V}^{\mathrm{ab}} &= \frac{\mu^{\mathrm{abxx}}E^2\cos^2\theta + \mu^{\mathrm{abyy}}E^2\sin^2\theta + 2\mu^{\mathrm{abxy}}E^2\cos\theta\sin\theta}{\xi^{\mathrm{xx}}E^2\cos^2\theta + \xi^{\mathrm{yy}}E^2\sin^2\theta},\\ &= \frac{\mu^{\mathrm{abxx}}\cos^2\theta + \mu^{\mathrm{abyy}}\sin^2\theta + 2\mu^{\mathrm{abxy}}\cos\theta\sin\theta}{\xi^{\mathrm{xx}}\cos^2\theta + \xi^{\mathrm{yy}}\sin^2\theta}.\end{aligned}$$

For an angle $\theta = \frac{\pi}{4}$ this expression can be reduced to

$$\mathcal{V}^{\mathrm{ab}} = \frac{\mu^{\mathrm{abxx}} + \mu^{\mathrm{abyy}} + 2\mu^{\mathrm{abxy}}}{\xi^{\mathrm{xx}} + \xi^{\mathrm{yy}}}.$$

The input files are

`chi1.kk_xx_yy_zz_...`	7 columns
`mu.kk_xxxx_xxxy_xxxz_xxyx_xxyy_xxyz_xxzx_xxzy_xxzz_...`	10 columns
`mu.kk_xyxx_xyxy_xyxz_xyyx_xyyy_xyyz_xyzx_xyzy_xyzz_...`	
`mu.kk_xzxx_xzxy_xzxz_xzyx_xzyy_xzyz_xzzx_xzzy_xzzz_...`	
`mu.kk_yxxx_yxxy_yxxz_yxyx_yxyy_yxyz_yxzx_yxzy_yxzz_...`	
`mu.kk_yyxx_yyxy_yyxz_yyyx_yyyy_yyyz_yyzx_yyzy_yyzz_...`	
`mu.kk_yzxx_yzxy_yzxz_yzyx_yzyy_yzyz_yzzx_yzzy_yzzz_...`	

Then I pasted first each `mu.kk...` followed for the `chi1.kk...` file to have 17 column file

	`mu.kk...`										`chi1.kk...`						
	energy	abxx	abxy	abxz	abyx	abyy	abyz	abzx	abzy	abzz	energy	Re xx	Im xx	Re yy	Im yy	Re zz	Im zz
column:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

I defined the variables

$$\texttt{coscuad} = \cos^2\theta$$
$$\texttt{sincuad} = \sin^2\theta$$
$$\texttt{cossin} = \cos\theta\sin\theta$$

and used `awk` comand to produce the corresponding `v.kk_ab... file as follows:`

```
awk '{ print $1, (($2*'‘‘$coscuad’’'+ $6* '‘‘$sincuad’’ '+ 2* $3* '‘‘$cossin’’')/($13* '‘‘$coscuad’’ '+ $15* '‘‘$sincuad’’ '+
0.00001)) }'
```