Mutual Inductor   K

K — Mutual inductor element

Description:
This element implements a mutual inductor model.

Form: k: *<instance name> n_r <parameter list>*

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n_r is the reference terminal.

Parameters:

Parameter	Type	Default value	Required?
l1: name of first inductor	STRING	N/A	Yes
l2: name of second inductor	STRING	N/A	Yes
coupling: Couplingvalue	DOUBLE	N/A	Yes

Example:
k:k1 0 coupling=0.9 l1="ind:ind1" l2="ind:ind2"

Model Documentation:
The mutual coupled inductor model represents coupled inductors by self inductances Li and mutual inductances Mij. Here Li is the self inductance of the ith inductor element and Mij is the mutual inductance of the ith and jth inductor elements. The mathematical model of the coupled element consists of voltage sources controlled by the time derivatives of current.

$$V_1 = L_1\frac{dI_1}{dt} + M_{12}\frac{dI_2}{dt} \qquad V_2 = L_2\frac{dI_2}{dt} + M_{21}\frac{dI_1}{dt}$$

$$K_{\text{COUPLING}} = \frac{M_{ij}}{\sqrt{L_iL_j}}$$

K_{COUPLING} may have any value between 0 and 1 including 1. Ferrite core provides almost ideal coupling 0.999 or higher.

References:
N/A

Sample Netlist:

```
**** Test netlist for K models ****
.options f0 = 5.1e9 method = 2 jupdm = 1
.tran2 tstop = 10e-3 tstep = .1e-3  nst=0 msv=0 deriv=0 im=1

ind:ind1 2 0 l=100u
ind:ind2 3 0 l=100u
k:k1 0 coupling=0.9 l1="ind:ind1" l2="ind:ind2"
vsource:vgs 1 0 vdc=2.5V vac=1V f=1e3
res:r0 1 2 r=10
res:r1 3 0 r=10

.out plot term 3 vt in "k.tran"
.out plot term 2 vt in "k.tran2"
.end
```
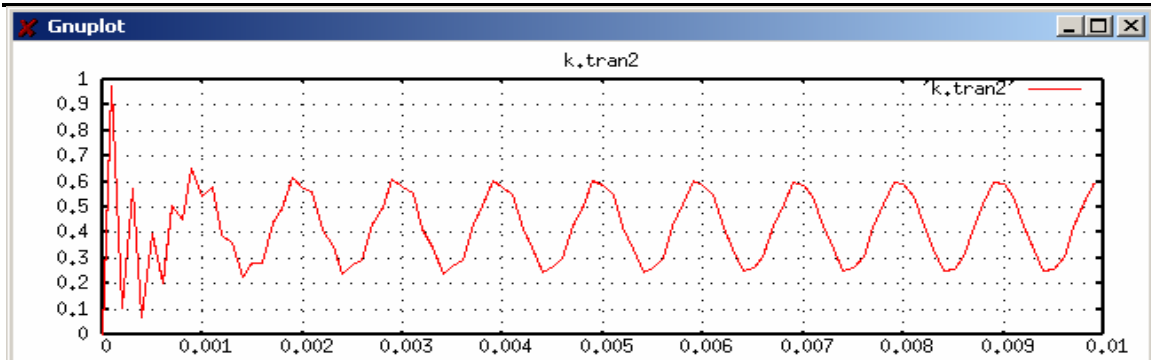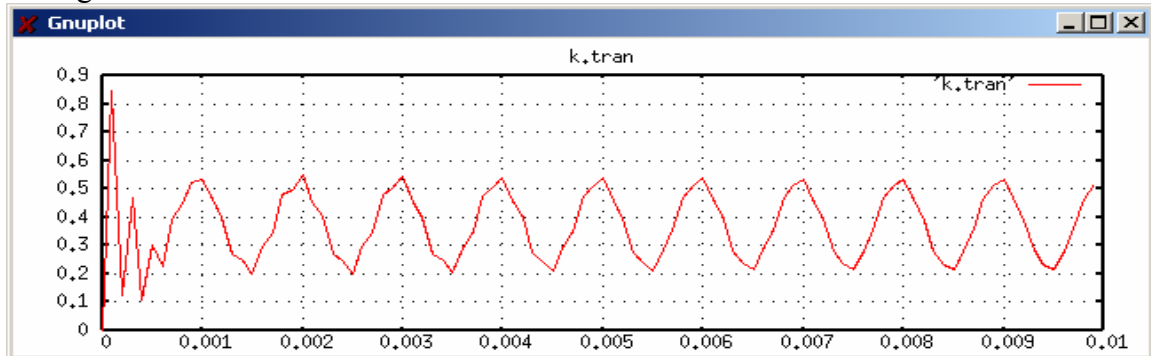
Validation:
Simulation Results for the sample netlist:
Voltage over inductor 1:

Voltage over inductor 2:

Known Bugs:
None.

Version: 2003.05.15

Credits:

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