

**Research notes**

**Another realization of an all-pass or a notch filter using a current conveyor†**

AHMED M. SOLIMAN

The College of Steubenville, Steubenville, Ohio 43952, U.S.A.

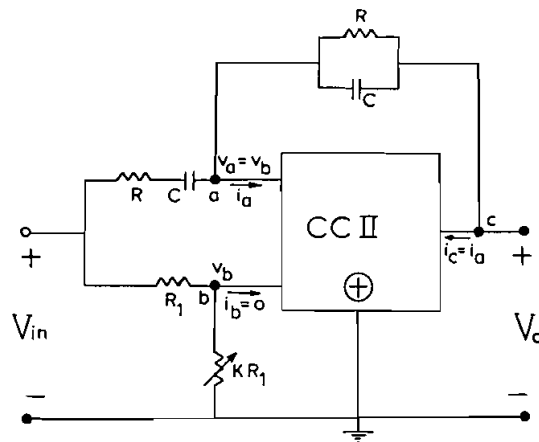
[Received 3 July 1972]

A canonic circuit, using the second generation current conveyor is described for realizing an all-pass or a notch characteristics.

The use of the second generation current conveyor (Sedra and Smith 1970) in realizing an all-pass transfer function was recently discussed by Soliman (1973). The purpose of this letter is to give an alternative canonical realization (uses the minimum number of capacitors) for the  $2\pi$  all-pass transfer function. By adjusting one resistor, the network realizes a notch filter.

The voltage transfer function of the circuit shown in the figure is given by :

$$\frac{V_o}{V_{in}} = \frac{K}{K+1} \frac{s^2 C^2 R^2 - \left(\frac{1}{2K} - 2\right) sCR + 1}{s^2 C^2 R^2 + 2sCR + 1} \quad (1)$$



Another realization of an all-pass or a notch filter using CCII.

If  $K = 0.125$ , an all-pass transfer function results. Its phase shift is given by

$$\phi = 2 \tan^{-1} \left( \frac{2}{X} \right) \quad (2)$$

† Communicated by the Author.

where

$$X = \omega CR - \frac{1}{\omega CR}. \quad (3)$$

Note that the circuit has similar phase characteristics as those given by Williams (1970).

The same circuit realizes a notch filter having a pole  $Q$  of 0.5 if  $K = 0.25$ .

#### REFERENCES

- SEDRA, A., and SMITH, K. C., 1970, *I.E.E.E. Trans. Circuit Theory*, **17**, 132.  
SOLIMAN, A. M., 1973, *I.E.E.E. Trans. Circuit Theory*, **20**, 80.  
WILLIAMS, P., 1970, *Electron. Lett.*, **6**, 184.