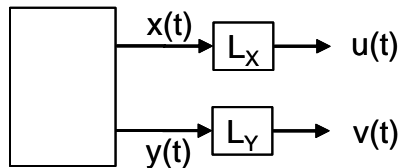Linear Systems, Black Boxes, and Beyond

Homework #2 (2010-2011)

Here, rectangles with letters inside represent linear filters, and rectangles with a "+" inside represents summation.

Q1: The reason for the normalization in the definition of coherency:



Given $x$ and $y$, signals whose spectra $P_X(\omega)$ and $P_Y(\omega)$, cross-spectrum $P_{X,Y}(\omega)$, and coherency $C_{X,Y}(\omega)$ are known, find the spectra of $u$ and $v$, their coherency, and coherence.

Q2. The cross-spectrum without explicit "common sources"
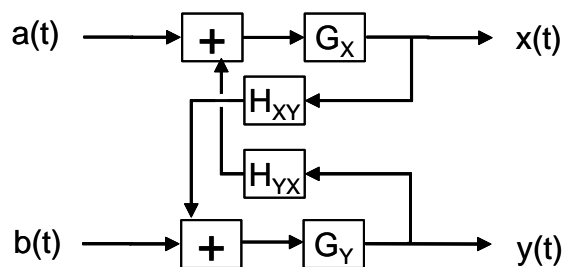


Given this setup, with $A$ and $B$ independent sources, find $P_X(\omega)$, $P_Y(\omega)$, and $P_{X,Y}(\omega)$ in terms of the power spectra of $A$ and $B$.