Linear canonical transforms: 40 years of developments

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Abstract: In 1970, linear canonical transforms were proposed in two very different contexts: as diffraction integrals, by Stuart A. Collins Jr.; and as unitary transformations that leave the uncertainty principle invariant, by Marcos Moshinsky and Christiane Quesne. It took three decades for the applied optics and theoretical physics researchers to acknowledge each other. It is an interesting case of cross fertilization, since mathematics customarily produces more results than are useful in laboratories. However, the division persists in the handling of discrete data sets, between those who strive for fast algorithms and those who value symmetry because it pleases the mind.