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*Comonotone approximation and interpolation by entire functions*

A theorem of Hoischen states that given a positive continuous function  $\varepsilon : \mathbb{R} \rightarrow \mathbb{R}$ , an integer  $n \geq 0$ , and a closed discrete set  $E \subseteq \mathbb{R}$ , any  $C^n$  function  $f : \mathbb{R} \rightarrow \mathbb{R}$  can be approximated by an entire function  $g$  so that for  $k = 0, \dots, n$ , and  $x \in \mathbb{R}$ ,  $|D^k g(x) - D^k f(x)| < \varepsilon(x)$ , and if  $x \in E$  then  $D^k g(x) = D^k f(x)$ . The approximating function  $g$  is entire and hence piecewise monotone. We determine conditions under which when  $f$  is piecewise monotone we can choose  $g$  to be comonotone with  $f$  (increasing and decreasing on the same intervals), and for the derivatives  $D^k g$  to be comonotone with  $D^k f$  when the latter are piecewise monotone.