

The method of (uncountably many) characteristics

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The method of characteristics is a standard technique for solving hyperbolic PDEs with constant or piecewise-constant coefficients. In the presence of more complicated spatial variation of coefficients, the method appears impractical since the number of characteristics arriving at any given point is uncountable. Problems of this kind arise naturally for wave propagation in the atmosphere and the ocean, for example. We present a numerical method for dealing with this infinity of characteristics and demonstrate an application to shoaling of ocean waves. Some interesting connections to other areas of mathematics will also be presented.