

# Zero phase velocity error finite-difference time-domain method for small space step and large time step sizes

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## Abstract

Unconditionally stable multi (4, 6, and 8) split-step finite-difference time-domain methods are isotropic for a certain space step size and a stability factor. It is shown in this letter that for small step sizes the phase velocity errors can be corrected by using a factor which is a function of the product of the space step size and the stability factor. This way, it is not necessary to obtain the multiplication factor each time when a different space step size is used. Also, by using this multiplication factor zero phase velocity error can be obtained in all directions at a chosen frequency. Performance analyses have shown that the method is also wideband. © 2011 Wiley Periodicals, Inc. *Microwave Opt Technol Lett* 54:423–426, 2012; View this article online at [wileyonlinelibrary.com](http://wileyonlinelibrary.com). DOI 10.1002/mop.26567