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$_{s}etup.pngGeneralstructureofacoherentopticalcommunicationsystem$
$_{s}etup.Atthetransmittertheinputdatabitsareprocessedbya DSPchain, whosetasksare:$
$toencodetheinformationbitstoprovideFEC, tomapbitstosymbolsandfinallytoproduceatime-$
$shapeddigitalwaveform, whichdependsonthemodulationformatused.Thiswaveformisfedtothe DAC, whichconvertsitf$
$wavelaser.Themodulationoftheand Qcomponentsoftheopticalsignalisusuallyperformedbyanexternal IQ-$
$modulatoremployinginterferometers.Themodulatedopticalfieldistransmittedthroughthefiber-$
$opticchannel, whichcanbecomposedofseveralspansofopticalfiberinterleavedwithopticalamplifiers(usually EDFAor Ra$
$electricalchannel, thendemodulatesthedigitalwaveformandfinallyperformserrorcorrectioninordertoretrievethein for$
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$_{N}FDM_{s}ystem, withaparticularfocusonthetransmitterandreceiver DSPchains.$
$(,)$
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$$\frac{\partial(,)}{\partial} = -2\partial^2(,)\partial^2 + |(,)|^2(,) \tag{1}$$

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$$= \sqrt{P}, \qquad = T_0, \qquad = - \tag{2}$$

$P =$
$\underline{\underline{|}}/(T_0^2)$
$\overline{2T_0^2/||}$
T_0

$$\frac{\partial}{\partial} = \pm\frac{\partial^2}{\partial^2} + 2||^2 \tag{3}$$

$\tilde{z}$
t
P
T_0
$_{n}ormalized_{p}m.$
$>$
0
$<$
0

$$\frac{\partial}{\partial} = \frac{\partial^2}{\partial^2} + 2||^2. \tag{4}$$

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$[]-[]-2||^2 = 0$ (5)

$[]+12[]+||^2 = 0.$ (6)

$$= \sqrt{P}, \qquad = T_0, \qquad = . \tag{7}$$

$P =$
$\underline{\underline{|}}/(T_0^2)$
$\overline{T_0^2/||}$
T_0
$_{o}f_{v}ariables_{N}LSEhasanadditionalminusandafactor2inthenormalizationofthespacecoordinate.Someoftheworkswhere$
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$[]+[]+2||^2 = 0,$ (8)

$\underline{_{o}f_{v}ariables_{N}LSEbutreplacingthechangeofvariable\rightarrow}$
$/$
$_{c}omparisonattheendofthechapter, asummaryofthedifferentformsofthenormalized NLSEpresentinliterature isgiven$
$_{n}ormalizedbelongstoaclassofnonlinear PDEthatcanbesolvedexactly, i.e., itispossibletofindanalyticalsolutions, byamat$
$_{n}ormalized[?].Theparallelismbetweenthetwomethodshasdrivensomeauthorstorenamethe IST as NFT[?], whichisthena$
$_{m}ethod.jpgSchemeoftheFouriermethodforsolvingthe IVP foralinear PDE$
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$$= [2], (,_0) = [0] \tag{9}$$

$[0]$
$_{0}$
$\mathcal{Q}(w,) = w^2\mathcal{Q}(w,), \mathcal{Q}(w,_0) = \mathcal{Q}_0(w)$