Fibre Bragg gratings and their applications

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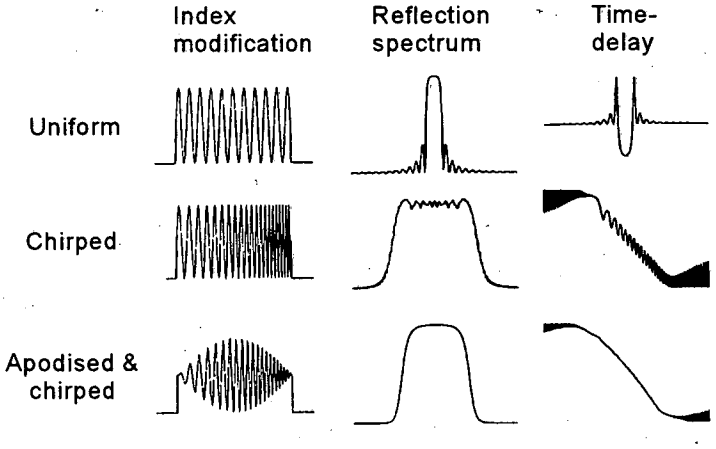
Optical fibre Bragg gratings are the most significant new fibre device since the EDFA and will have a major impact on the design and implementation of future optical networks. Applications include single and multichannel add/drop filters, EDFA gain stabilising and spectrum flattening filters, dispersion compensation, as well as wavelength stable sources for WDM networks.

This tutorial will cover the key aspects of fibre gratings relevant to telecommunications applications. These include fabrication and processing, the pros and cons of the different host fibres as well as hydrogenation and their effect on stability. The design and performance of apodised, chirped and multistage gratings will be covered. Finally, significant emphasis will be given to the key applications of fibre gratings.

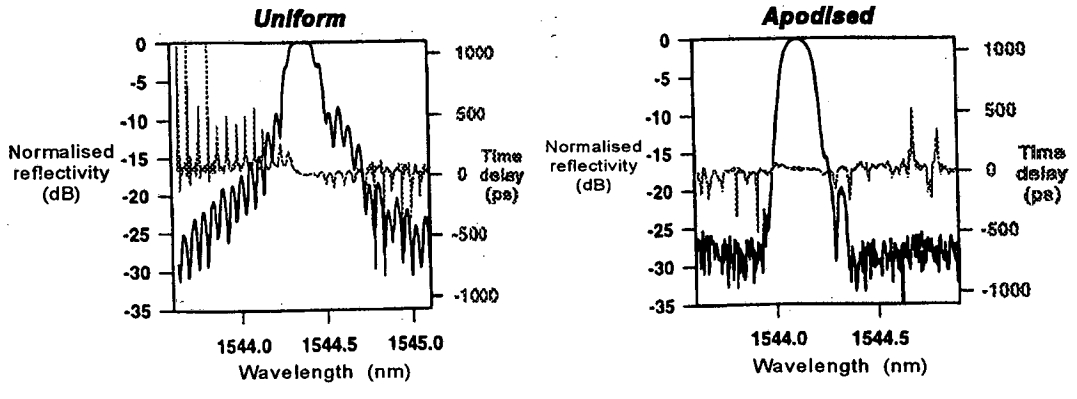
Applications of fibre gratings

- Add/drop MUX
- Dispersion compensation
- Gain flattening
- Wavelength stable sources
  - fibre DFB laser
  - grating feedback semiconductor laser
- Switching/pulse processing
- Tunable filters?

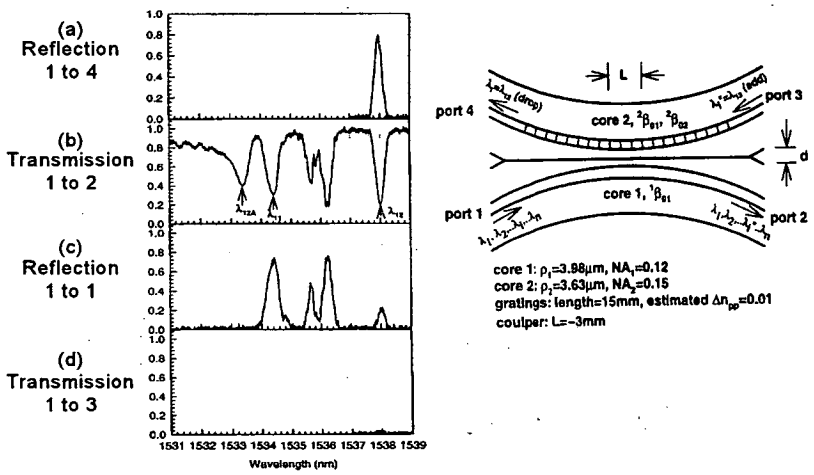
Types of fibre Bragg gratings



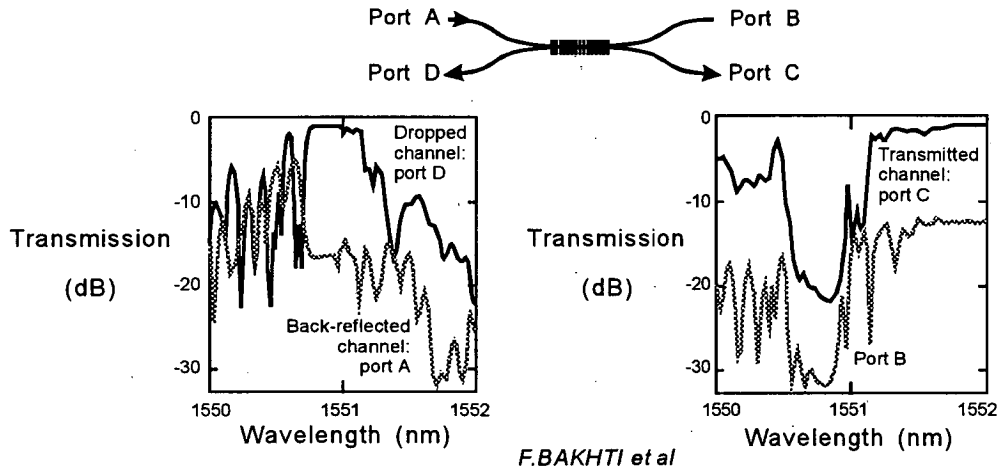
Comparison of uniform and apodised gratings



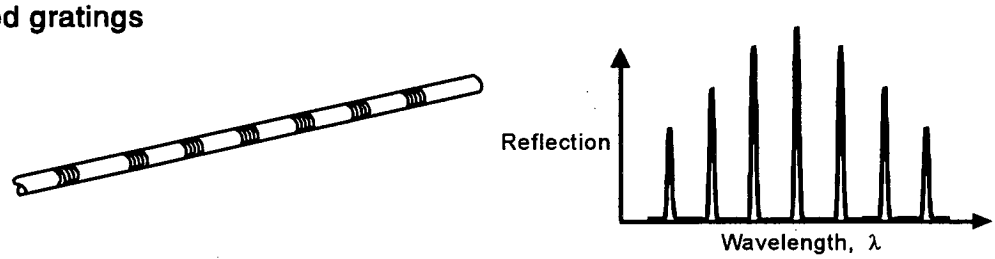
Grating assisted mismatched coupler based OADM



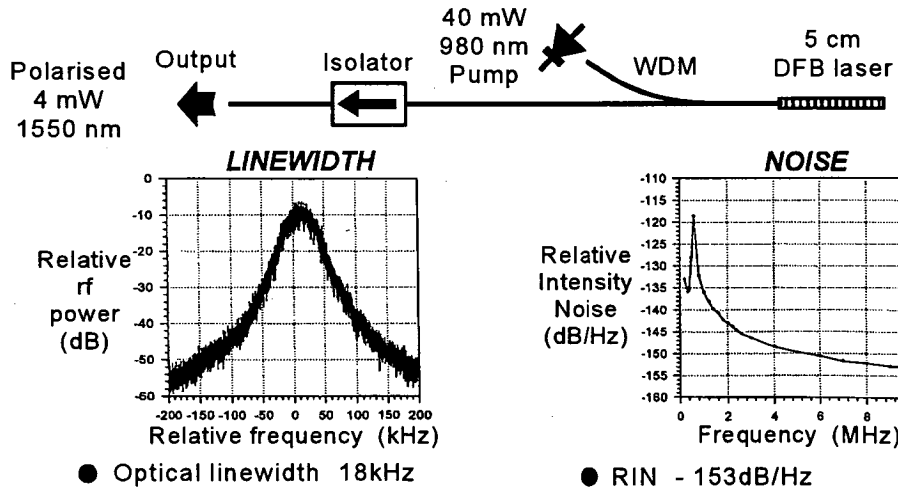
Flat-top drop filter formed in 100% fused coupler



Sampled gratings



5cm DFB Fibre Laser Performance



- Optical linewidth 18kHz
- RIN - 153dB/Hz

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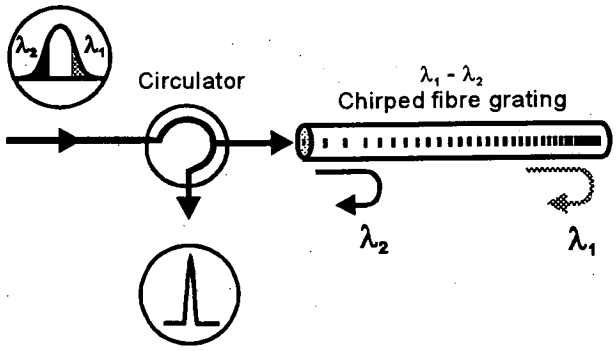
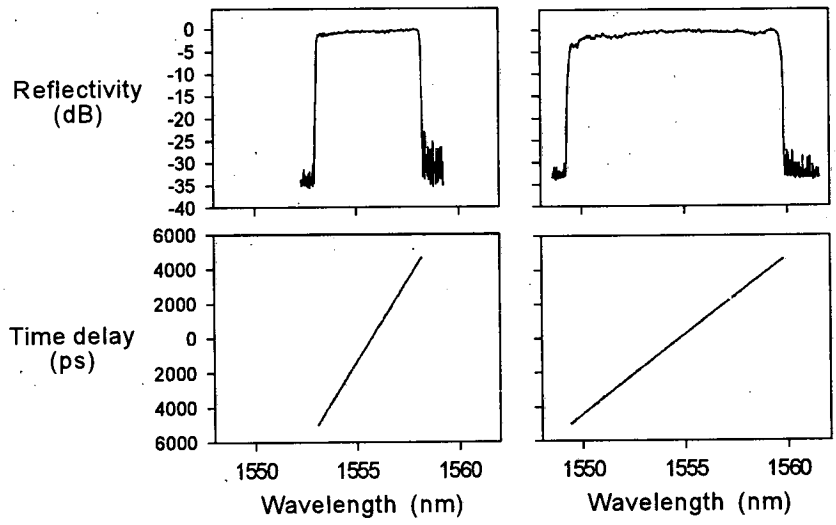
Advantages of chirped fibre gratings

- Compact
- Low-loss
- No non-linearity
- Polarization insensitive
- Wavelength selection
- Tunability
- Complex dispersion
- Repeatable



1 metre, 5nm & 10nm bandwidth continuously chirped gratings



Partial Dispersion Compensated 10Gbit/s Soliton Transmission over 1000km of Standard fibre