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274

DESIGN AND PERFORMANCE OF SPECIALTY FIBRES

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ABSTRACT

A number of special fibres uniquely suited to a wide range of devices are reviewed. These fibres have applications in polarisation-control, fibre sensors and active fibre circuitry.

SUMMARY

Currently the great majority of experimental and commercial fibre devices and sensors employ telecommunications-grade fibres, largely because of their ready availability. It is apparent, however, that optical fibre fabrications technology can be extended to produce novel fibres uniquely suited to a wide range of devices and applications. Different fibre structures and materials can lead to considerable improvements in device performance. New active and passive fibre components are possible and allow the construction of novel sensors and fibre devices for optical

circuitry.

In this paper both existing and emerging special fibres will be reviewed. Polarisation-maintaining fibres, either linearly or circularly-birefringent, are perhaps the best known. However, composite metal and glass fibres for polarisers and Kerr-modulators have been reported. In addition, fibres composed of compound glasses or polymers can lead to considerable improvements in non-linear acousto-, magtneto- or electro-optic interactions.

A very recent development has been the incorporation of rare-earths into single-mode fibres to produce tunable fibres lasers, amplifiers, switching devices and distributed sensors. This is a particularly fertile area for special fibres and has already produced a number of active fibre devices.