Proposed simulation approach: polarization rotation and consideration of connectors

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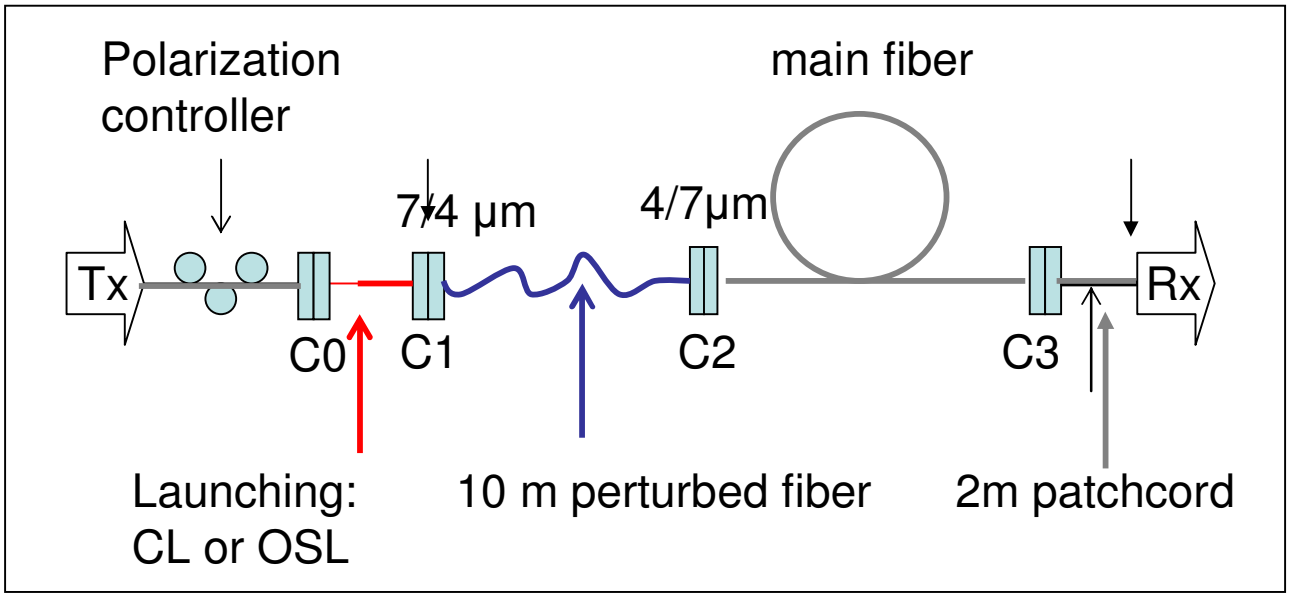
Proposed multi- connector link

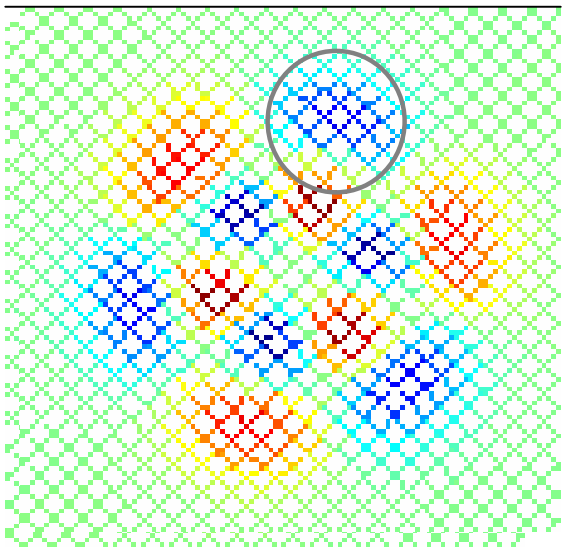


1. Fiber Length: 220m and 300m
2. Polarization rotation is considered

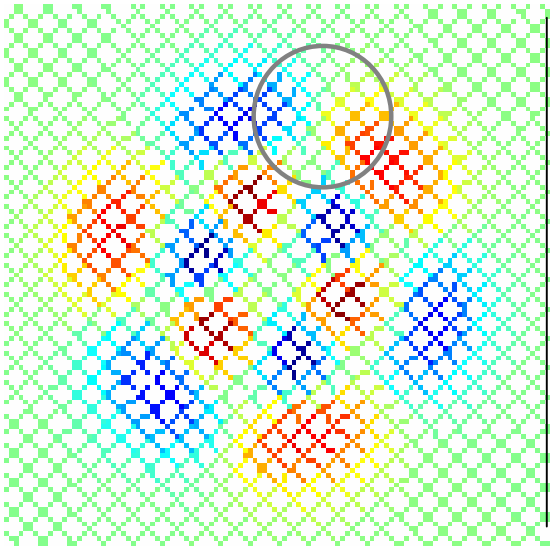
Polarization induced power coupling variation

Modal field $\Psi(r)\cos(l\phi)$ and input optical field

Input polarization 1

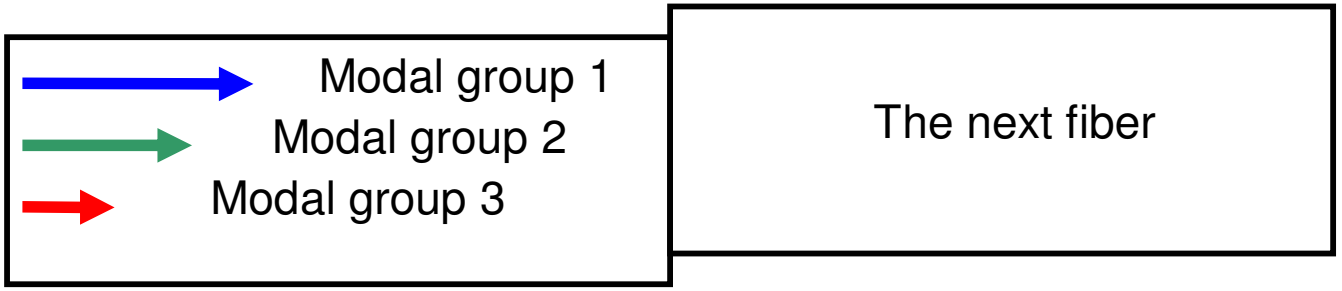


Input polarization 2



No mode mixing in one modal group is considered.

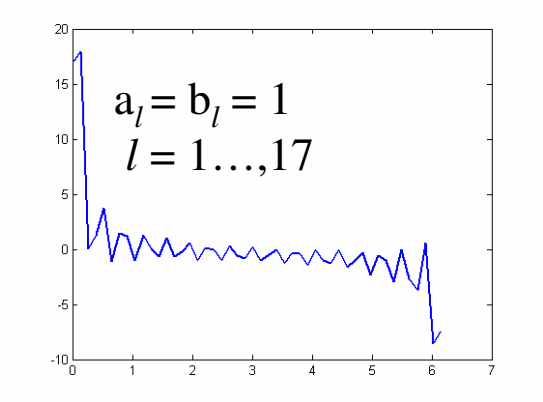
Consideration of connector offset I

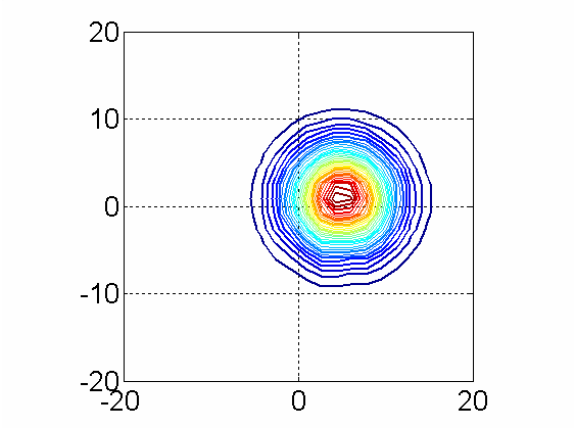


1. The input electrical field to the next fiber needs to be reconstructed from the modes of previous fiber
2. The electrical field profile at the end of the first fiber varies with time
3. The electrical field profile of each modal group may not be symmetric around the fiber core

For fix r, modal field can be written as

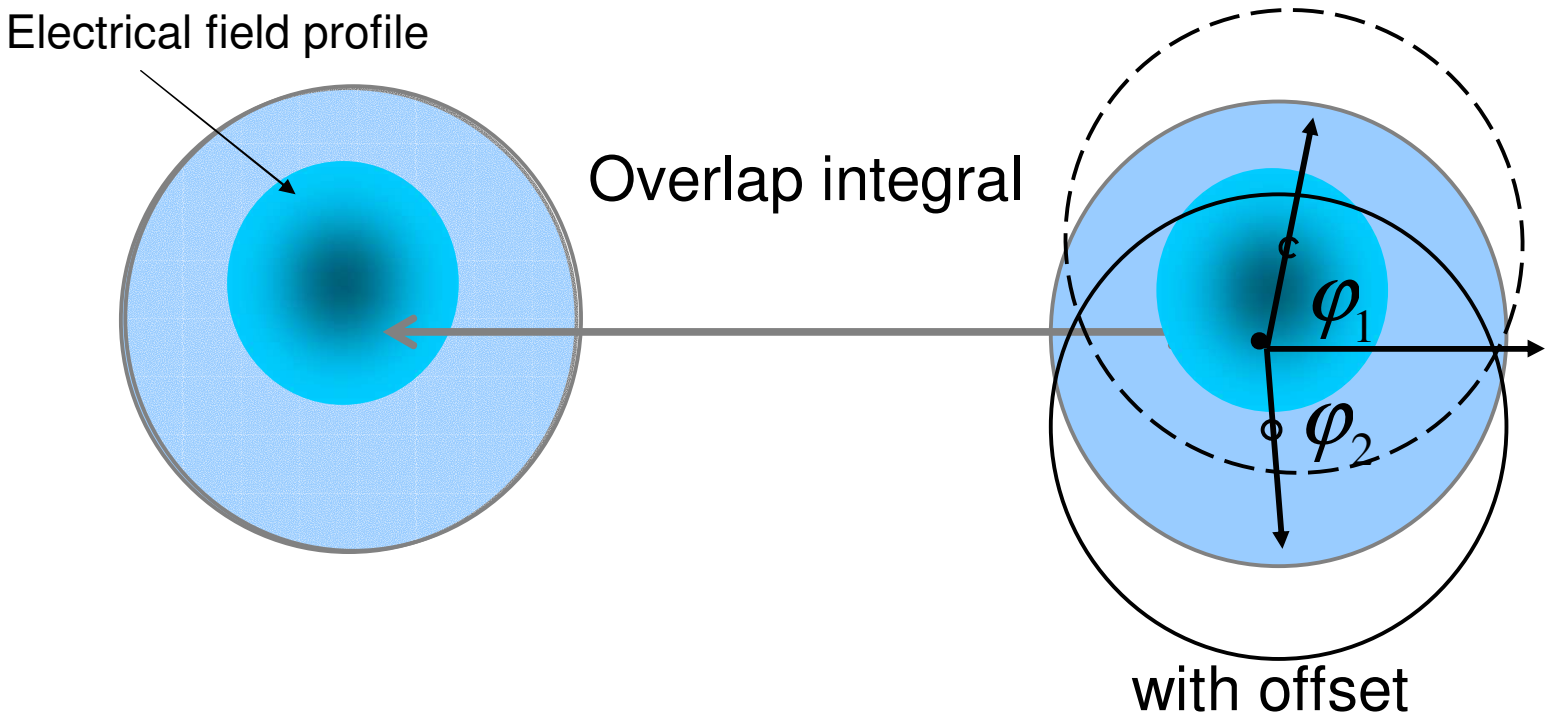
$$\sum_{l} a_l \cos(l\theta) + b_l \sin(l\theta)$$





Output field profile of 10 m fiber with 5μm offset at input

Consideration of connector offset II



Same among of mismatch from fiber core to fiber core may cause different mode cross coupling. Simulation of connector offset should take this into account.

Summary

1. Polarization rotation of the input beam is equivalent as rotating the modal field in the fiber.
2. The pulse variation due to the change of polarization can be simulated if the mode mixing is not completed or there is a mode selective loss in the link.
3. Due to the short length of the first MMF in the proposed link, modes within one modal group need to be treated individually.
4. The modal field profile at the end of first MMF varies with time and is not symmetric around the fiber core with an off-centered launching condition.
5. The overlap of modal fields at the connector depends on the relative location of the offset center to the reference coordinates and the pulse response will change accordingly.