$$PMD_{\mathrm{L}} = \sqrt{PMD_{\mathrm{F}}^2 + PMD_{\mathrm{E}}^2}, \quad [\mathrm{ps}] \qquad (5)$$

where PMD_L represents an unknown PMD value of the whole optical line, PMD_F is a well-known PMD value of the optical fiber (see table I) and PMD_E is a true PMD value obtained by the SSA measurement (Table II).

In case of the FA method, the PMD_F parameter was considered to be FA Span 100 nm (0.38 ps) from Table I.

TABLE III
REFERENCE MEASUREMENT WITH PMD EMULATOR

PMD 1[ps]	PMD_L 1 [ps]	PMD 5 [ps]	PMD_L 5 [ps]	PMD 10 [ps]	PMD_L 10 [ps]
0.95	0.94	5.14	5.07	11.48	10.43

TABLE IV
FA METHOD WITH PMD EMULATOR FOR DIFFERENT SPANS.

PMD 1 [ps] Span 50 [nm]	PMD 1 [ps] Span 100 [nm]	PMD_L 1 [ps]
0.87	0.86	0.97
-	-	-
PMD 5 [ps] Span 5 [nm]	PMD 5 [ps] Span 20 [nm]	PMD_L 5 [ps]
6.15	5.70	5.07
-	-	-
PMD 10 [ps] Span 5 [nm]	PMD 10 [ps] Span 20 [nm]	PMD_L 10 [ps]
10.02	10.07	10.44

The RM seems to be accurate at this point too, however, for 10 ps etalon the value was over limit. The difference between measured and calculated PMD values exceeds 1 ps. On the other hand, the FA method results exhibit a similar problem for 5 ps etalon measurement. This can be caused by the effect of stress elements on the fiber which could cause an extra birefringence in the fiber and PMD increasing.

VII. CONCLUSION

In this paper, the Fixed Analyzer method for PMD measurement was presented theoretically and also experimentally. This technique brings accurate results and has many advantages. However, there are also disadvantages like, for example, the problem with the correct span parameter settings, which can affect measurement. Moreover, laboratory optical spectrum analyzers are quite robust devices and therefore this configuration is suitable only for measurement in laboratory. Commercially available CD/PMD analyzer FTB-5700 is a compact and resistant device. Moreover, using this device is intuitive and user-friendly, which means that it is suitable not only for researchers but also for internet service providers.

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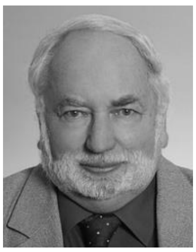

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