Three coupled wave guides and third order exceptional points

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A PT-symmetric model for three interacting wave guides is investigated. Each wave guide is represented by an attractive delta-function potential being in equi-distant positions. The two outer potentials are complex describing loss and gain, respectively. The real parts of the outer potentials are assumed to be equal. The major focus of the study lies on the occurrence of an exceptional point of third order and the physical effects of such singularity. While some results resemble those from similar studies with two wave guides, the three wave guides appear to have a richer structure. Emphasis is placed on the fine tuning in the approach of the EP3 as this appears to be a particular challenge for an experimental realization