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Meanders: Sturm global attractors, seaweed Lie algebras and classical Yang-Baxter equation

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Our aim is to give an overview on recent results obtained in our Ph.D. thesis. Meanders are closed Jordan curves in the plane intersecting the straight horizontal line transversely and without self-intersections. By the Jordan Curve Theorem and vertex-gluing we introduce the *collapse* of meanders and furthermore the *multiple collapse*. Both, the collapse and the multiple collapse introduced for meanders yield sufficient arguments in order to prove the *Obstruction-Theorem*, which ensures that it is not possible to find any closed expression in terms of the greatest common divisor of homogeneous polynomials of arbitrary degrees with integer coefficients for the number of connected components of seaweed meanders with at least four upper rainbow blocks. Moreover, the collapse yields the relation between the seaweed Lie algebras and seaweed meanders by using the results of A. Kirillov and V. Dergachev on representing a seaweed Lie algebra by *meander graphs*. As we will see meander graphs are collapsed seaweed meanders. By introducing right and left one-shift maps applied to meanders we describe different classes of Morse meanders, which we call of *type I, II, III, and IV*. By using combinatorial description of Sturm global attractors of

$$\text{(PDE)}, \text{(N)} \begin{cases} u_t = a(x)u_{xx} + f(x,u,u_x), \; 0 < x < 1 \\ u_x = 0, \; x = 0 \; or \; x = 1. \end{cases} \tag{1}$$

established by Bernold Fiedler and Carlos Rocha we study the corresponding *connection graphs* with respect to the graph isomorphy. Here, we show some results for connection graphs expressed in terms of the group action on canonical trees corresponding to blocks of *Morse meanders of type I*.