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Sylvester equations for Laguerre-Hahn orthogonal polynomials on the real line

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The main purpose of the talk is to introduce matrix Sylvester differential equations in the study of Laguerre-Hahn orthogonal polynomials.

It is shown an equivalence between the scalar Riccati differential equation for the Stieltjes function and matrix Sylvester differential equations for matrices defined in terms of the corresponding orthogonal polynomials. Such an equivalence allows one to obtain representations for Laguerre-Hahn orthogonal polynomials. Furthermore, one obtains Lax pairs formed from the matrix differential equations and the recurrence relation, yielding Laguerre-Freud's type equations for the recurrence relation coefficients of the orthogonal polynomials.