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**Polynomial root-finders and the algebraic eigenproblem
with the matrix structure in the interplay**

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By using matrix methods for polynomial root-finding and exploiting matrix structure, we devise a QR-like algorithm that uses linear time per iteration, preserving the robustness and rapid convergence of the classical QR iteration. We also explore the converse reduction of the eigenproblem to polynomial root-finding without computing the coefficients and obtain some promising results.