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Neelam Singha* (neelam.singha1990@gmail.com), Department of Mathematics, IIT KGP, Kharagpur, 721302, India, and **Chandal Nahak**. *Applications of orthogonal polynomials for solving a class of fractional optimal control problems.*

The concept of fractional calculus emerged with the possibility of defining non-integer order derivatives. The modernization of classical problems and properties in fractional calculus sense, motivate us to inspect admissible applications and physical properties unattended by integer order operators. The need to investigate optimal control problems with dynamical constraints involving fractional order operators give rise to the problem of fractional optimal control. In literature, orthogonal polynomials like Chebyshev polynomials, Jacobi polynomials, Legendre polynomials, have already practiced while handling FOCPs. In this report, we discuss a class of fractional optimal control problems, where the system dynamical constraint involves a combination of classical and fractional derivatives. We have designed a well-organized algorithm to obtain the numerical solution of the proposed problem by exercising Laguerre orthogonal polynomials. The key motive associated with the present approach is to convert the concerned fractional optimal control problem to an equivalent standard quadratic programming problem with linear equality constraints. Given examples and graphically representations analyze the computational technique of the method together with its efficiency and accuracy. (Received September 05, 2017)