Necessary and Sufficient Optimality Conditions for Mathematical Programs with Equilibrium Constraints

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We consider a mathematical program with equilibrium constraints (MPEC) formulated as a mathematical program with complementarity constraints. We give a simple proof to the M-stationary condition and show that it is sufficient or locally sufficient for optimality under some MPEC generalized convexity assumptions. Moreover we propose new constraint qualifications for M-stationary conditions to hold. These new constraint qualifications include piecewise MFCQ, piecewise Slater condition, MPEC weak reverse convex constraint qualification, MPEC Arrow-Hurwicz-Uzawa constraint qualification, MPEC Zangwill constraint qualification, MPEC Kuhn-Tucker constraint qualification and MPEC Abadie constraint qualification.