The MATPOWER case format also allows for additional fields to be included in the structure. The OPF is designed to recognize fields named `A`, `l`, `u`, `H`, `Cw`, `N`, `fparm`, `z0`, `zl` and `zu` as parameters used to directly extend the OPF formulation as described in Section 7.1. Additional standard optional fields include `bus_name`, `gentype` and `genfuel`.[61] Other user-defined fields may also be included, such as the `reserves` field used in the example code throughout Section 7.3. The `loadcase` function will automatically load any extra fields from a case file and, if the appropriate `'savecase'` callback function (see Section 7.3.5) is added via `add_userfcn`, `savecase` will also save them back to a case file.

Table B-1: Bus Data (`mpc.bus`)

name	column	description
BUS_I	1	bus number (positive integer)
BUS_TYPE	2	bus type (1 = PQ, 2 = PV, 3 = ref, 4 = isolated)
PD	3	real power demand (MW)
QD	4	reactive power demand (MVAr)
GS	5	shunt conductance (MW demanded at $V = 1.0$ p.u.)
BS	6	shunt susceptance (MVAr injected at $V = 1.0$ p.u.)
BUS_AREA	7	area number (positive integer)
VM	8	voltage magnitude (p.u.)
VA	9	voltage angle (degrees)
BASE_KV	10	base voltage (kV)
ZONE	11	loss zone (positive integer)
VMAX	12	maximum voltage magnitude (p.u.)
VMIN	13	minimum voltage magnitude (p.u.)
LAM_P†	14	Lagrange multiplier on real power mismatch (u/MW)
LAM_Q†	15	Lagrange multiplier on reactive power mismatch (u/MVAr)
MU_VMAX†	16	Kuhn-Tucker multiplier on upper voltage limit (u/p.u.)
MU_VMIN†	17	Kuhn-Tucker multiplier on lower voltage limit (u/p.u.)

† Included in OPF output, typically not included (or ignored) in input matrix. Here we assume the objective function has units u.

[61] All three of these are cell arrays of strings. See `gentypes` and `genfuels` for more information on the corresponding fields.

Table B-2: Generator Data (mpc.gen)

name	column	description
GEN_BUS	1	bus number
PG	2	real power output (MW)
QG	3	reactive power output (MVAr)
QMAX	4	maximum reactive power output (MVAr)
QMIN	5	minimum reactive power output (MVAr)
VG‡	6	voltage magnitude setpoint (p.u.)
MBASE	7	total MVA base of machine, defaults to baseMVA
GEN_STATUS	8	machine status, > 0 = machine in-service ≤ 0 = machine out-of-service
PMAX	9	maximum real power output (MW)
PMIN	10	minimum real power output (MW)
PC1*	11	lower real power output of PQ capability curve (MW)
PC2*	12	upper real power output of PQ capability curve (MW)
QC1MIN*	13	minimum reactive power output at PC1 (MVAr)
QC1MAX*	14	maximum reactive power output at PC1 (MVAr)
QC2MIN*	15	minimum reactive power output at PC2 (MVAr)
QC2MAX*	16	maximum reactive power output at PC2 (MVAr)
RAMP_AGC*	17	ramp rate for load following/AGC (MW/min)
RAMP_10*	18	ramp rate for 10 minute reserves (MW)
RAMP_30*	19	ramp rate for 30 minute reserves (MW)
RAMP_Q*	20	ramp rate for reactive power (2 sec timescale) (MVAr/min)
APF*	21	area participation factor
MU_PMAX†	22	Kuhn-Tucker multiplier on upper P_g limit (u/MW)
MU_PMIN†	23	Kuhn-Tucker multiplier on lower P_g limit (u/MW)
MU_QMAX†	24	Kuhn-Tucker multiplier on upper Q_g limit (u/MVAr)
MU_QMIN†	25	Kuhn-Tucker multiplier on lower Q_g limit (u/MVAr)

* Not included in version 1 case format.

† Included in OPF output, typically not included (or ignored) in input matrix. Here we assume the objective function has units u.

‡ Used to determine voltage setpoint for optimal power flow only if opf.use_vg option is non-zero (0 by default). Otherwise generator voltage range is determined by limits set for corresponding bus in bus matrix.

Table B-3: Branch Data (`mpc.branch`)

name	column	description
`F_BUS`	1	"from" bus number
`T_BUS`	2	"to" bus number
`BR_R`	3	resistance (p.u.)
`BR_X`	4	reactance (p.u.)
`BR_B`	5	total line charging susceptance (p.u.)
`RATE_A`*	6	MVA rating A (long term rating), set to 0 for unlimited
`RATE_B`*	7	MVA rating B (short term rating), set to 0 for unlimited
`RATE_C`*	8	MVA rating C (emergency rating), set to 0 for unlimited
`TAP`	9	transformer off nominal turns ratio, if non-zero (taps at "from" bus, impedance at "to" bus, i.e. if $r = x = b = 0$, $tap = \frac{\lvert V_f \rvert}{\lvert V_t \rvert}$; $tap = 0$ used to indicate transmission line rather than transformer, i.e. mathematically equivalent to transformer with $tap = 1$)
`SHIFT`	10	transformer phase shift angle (degrees), positive $\Rightarrow$ delay
`BR_STATUS`	11	initial branch status, 1 = in-service, 0 = out-of-service
`ANGMIN`†	12	minimum angle difference, $\theta_f - \theta_t$ (degrees)
`ANGMAX`†	13	maximum angle difference, $\theta_f - \theta_t$ (degrees)
`PF`‡	14	real power injected at "from" bus end (MW)
`QF`‡	15	reactive power injected at "from" bus end (MVAr)
`PT`‡	16	real power injected at "to" bus end (MW)
`QT`‡	17	reactive power injected at "to" bus end (MVAr)
`MU_SF`§	18	Kuhn-Tucker multiplier on MVA limit at "from" bus (u/MVA)
`MU_ST`§	19	Kuhn-Tucker multiplier on MVA limit at "to" bus (u/MVA)
`MU_ANGMIN`§	20	Kuhn-Tucker multiplier lower angle difference limit (u/degree)
`MU_ANGMAX`§	21	Kuhn-Tucker multiplier upper angle difference limit (u/degree)

* Used to specify branch flow limits. By default these are limits on apparent power with units in MVA. However, the `'opf.flow_lim'` option can be used to specify that the limits are active power or current, in which case the ratings are specified in MW or ($\text{kA} \cdot V_{\text{basekV}}$), respectively. For current this is equivalent to an MVA value at a 1 p.u. voltage.

† Not included in version 1 case format. The voltage angle difference is taken to be unbounded below if `ANGMIN` ≤ -360 and unbounded above if `ANGMAX` ≥ 360. If both parameters are zero, the voltage angle difference is unconstrained.

‡ Included in power flow and OPF output, ignored on input.

§ Included in OPF output, typically not included (or ignored) in input matrix. Here we assume the objective function has units u.

Table B-4: Generator Cost Data† (`mpc.gencost`)

name	column	description
`MODEL`	1	cost model, 1 = piecewise linear, 2 = polynomial
`STARTUP`	2	startup cost in US dollars*
`SHUTDOWN`	3	shutdown cost in US dollars*
`NCOST`	4	number $N = n + 1$ of data points defining an n-segment piecewise linear cost function, or of coefficients defining an n-th order polynomial cost function
`COST`	5	parameters defining total cost function $f(p)$ begin in this column, units of f and p are \$/hr and MW (or MVAr), respectively (`MODEL` = 1) $\Rightarrow \quad p_1, f_1, p_2, f_2, \ldots, p_N, f_N$ where $p_1 < p_2 < \cdots < p_N$ and the cost $f(p)$ is defined by the coordinates (p_1, f_1), (p_2, f_2), ..., (p_N, f_N) of the end/break-points of the piecewise linear cost (`MODEL` = 2) $\Rightarrow \quad c_n, \ldots, c_1, c_0$ N coefficients of n-th order polynomial cost function, starting with highest order, where cost is $f(p) = c_n p^n + \cdots + c_1 p + c_0$

† If `gen` has n_g rows, then the first n_g rows of `gencost` contain the costs for active power produced by the corresponding generators. If `gencost` has $2n_g$ rows, then rows $n_g + 1$ through $2n_g$ contain the reactive power costs in the same format.

* Not currently used by any Matpower functions.