The **A** matrix:

* + is (*n+m*)x(*n+m*) in size, and consists only of known quantities.
  + the *n*x*n* part of the matrix in the upper left:
    - has only passive elements
    - elements connected to ground appear only on the diagonal
    - elements not connected to ground are both on the diagonal and off-diagonal terms.
  + the rest of the **A** matrix (not included in the *n*x*n* upper left part) contains only 1, -1 and 0 (other values are possible if there are dependent current and voltage sources; I have not considered these cases.  Consult [Litovski](https://www.swarthmore.edu/NatSci/echeeve1/Ref/mna/MNARefs.html" \l "Litovski) if interested.)
* The **x** matrix:
  + is an (*n+m*)x1 vector that holds the unknown quantities (node voltages and the currents through the independent voltage sources).
  + the top *n* elements are the *n*node voltages.
  + the bottom *m* elements represent the currents through the *m* independent voltage sources in the circuit.
* The **z** matrix:
  + is an (*n+m*)x1 vector that holds only known quantities
  + the top *n* elements are either zero or the sum and difference of independent current sources in the circuit.
  + the bottom *m* elements represent the *m* independent voltage sources in the circuit. [1]

The **A** matrix is (*m*+*n*)x(*m*+*n*) (*n* is the number of nodes, and *m* is the number of independent voltage sources) and:

* the **G** matrix is *n x n* and is determined by the interconnections between the passive circuit elements (resistors)
* the **B** matrix is *n x m* and is determined by the connection of the voltage sources.
* the **C** matrix is *m x n*and is determined by the connection of the voltage sources.  (**B**and **C** are closely related, particularly when only independent sources are considered).
* **the D matrix is *m x m* and is zero if only independent sources are considered. [1]**

# Special matrices and arrays

The [**Matrix**](https://eigen.tuxfamily.org/dox/classEigen_1_1Matrix.html) and [**Array**](https://eigen.tuxfamily.org/dox/classEigen_1_1Array.html) classes have static methods like [**Zero()**](https://eigen.tuxfamily.org/dox/classEigen_1_1DenseBase.html#a422ddeef58bedc7bddb1d4357688d761), which can be used to initialize all coefficients to zero. [2]

References:-

[1]<https://www.swarthmore.edu/NatSci/echeeve1/Ref/mna/MNA2.html>

[2]<https://eigen.tuxfamily.org/dox/group__TutorialAdvancedInitialization.html>

<https://eigen.tuxfamily.org/dox/group__TutorialBlockOperations.html>