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We are interested in symbolic dynamical systems generated by bi-infinite fixed-points of primitive substitutions over an alphabet with two letters that are *invertible*, i.e., that are also automorphisms of the free group with two generators. Such substitutions are also known as *Sturmian* substitutions, i.e., the language generated by such a substitution has exactly $n + 1$ subwords of length n for every natural number n .

It is useful to consider the *substitution matrix* (also known as *incidence matrix* or *Abelianization matrix*) associated to such substitutions, namely, the matrix the ij -entry of which counts the number of occurrences of the letter i in the substitute of the letter j . Here, this substitution matrix is an element of $GL(2, \mathbb{Z})$. Using the theory of continued fractions, we first calculate eigenvalues and eigenvectors, which yield basic combinatorial information like the letter frequencies in the bi-infinite fixed-points, and then also consider the question which of these dynamical systems are topologically conjugate. (Received September 20, 2016)