Decomposition en elements simples

Grief: Previous full calculation: The practice of a complete calculation of subsections In this (long) chapter, we show how you can find a primitive for any rational faction where the polynoms are located. We will act in stages, illustrating the theory by example the first part of this chapter is rather algebraic: we quote and use here some important algebra theorems without a demonstration, which has no place in this process of analysis. Euclidian Division 1 step: We use the theoreum (and definition: Euclidian division) Be, . So there is one pair of such, and he said that is a factor, and the rest of the Euclidian division is nominal . So we can write with. Pauline called the whole part of the rational faction. An example of the Euclidian division carried out as follows: Therefore we have an irreparable Polynema 2 stage: So we now consider a rational faction such as . To do this, the definition of Unpretentious Polynema (on) are a degree 1 polynoma and a degree 2 polynomes with no real root (c). Polynom unitary, if the highest-degree ratio is 1. We will use theorem any polynema to decompose in a unique way into product form i.e. constants, which is the ratio of the term highest degree, and unassuming units of polynoms: are the roots (different) , their multiplication, and the factors of degree 2 without the real root (c ). This decomposition is used for polynomy to the denominator of a rational faction. It is further assumed that the numerator has no common factor with the denominator, otherwise one simplifies this common factor. Example To find factoring, you start by searching for the obvious roots groping (i.e. trying to value 0, ,...). We find it and therefore divide it. One performs the division gold of the Euclidian, therefore, indeed, it is 3 degrees trin'me to negative difference. Poles and Simple Elements 3 Step Definition He said that , is an irreparable rational faction, if polynomes and without a common factor. The roots of the polynome are called poles of an irreparable rational faction. Or irreparable decomposition. Simple types of elements associated with poles are called rational type functions where they are real constants. Simple types of elements associated with irreparable polynomes are called rational functions of the type where they are real constants. Example Describe simple elements of simple species elements: Diversity Pole 2 2 Simple Elements: Pole Plurality 1 1 Simple Elements: . Simple elements : · 1 only related to the irreparable factor: . Warning: you should always make sure that the denominator is completely decomposed! For example, one could write as; it doesn't allow you to see simple elements right away. Be theore see-it-all. irreparable rationality. So if, (div.euclidian par), we have an inch disintegrating uniquely, as the sum of all the simple elements involved: Exercise Give the structure decomposition into simple elements . We have NB: when we ask only the structure of decomposition, we can leave uncertain. Calculating decomposition rates into simple 4 steps: (most difficult...) a): FOR MULTIPLICITY SIMPLE POLES 1 Eq is multiplied. (out) by, and one accepts: in the right member survives only, whose value is given by the member on the left, with (simplified). For example, let's take this to the calculation: By multiplying, one has and poses, (b): COEFF. To find a coefficient that corresponds to the pole of order, we multiply, then we take: as above, we find coeff. Wanted. In our example, we define by multiplying by: and taking. c): COEFF. FACTEURSS THE same method can be applied, but with complex roots of these factors. To do this, we multiply by factor, then take equal to one of the complex roots of the postman to find (with a real and imaginary part) a couff. and: In our case, the roots, therefore, 2 non-trivial 3 roots unit, . (Indeed, it needs to be checked that it is really a pole when calculating.) Multiplying and taking, we find what gives (the real and imaginary part) odds and after a small calculation. However, here this calculation of complex numbers is a bit cumbersome and we will use a different method, such as that limitation. d): OTHER COEF. These ratios can also be calculated by variable change. This brings us back to the pole in. To calculate the odds associated with this pole, one is divided into other factors depending on the increasing strength in, the order; one stops when the rest contains only the terms of the degree more or equals in order to be able to put in the factor. The coefficient then gives all the odds associated with the pole. Example In our example, variable change, so we then share according to the increasing powers, to order 1: Hence: By dividing by, we and withdraw from the first term that and. NB: this method is especially interesting, if there is a pole of plurality (and a few other factors in, or so, if it's from the beginning of the pole in (which avoids variable change). e): GENERAL METHODS FOR COEFF. RESTANTS (i): The method of limitation This method consists of first multiplying by the lowest power, which interferes with decomposition into simple elements, and taking a limit (where this is enough to preserve higher powers). Thus, we have in the right composition the sum of coefficients corresponding to this power, which allows us to determine the ratio from the point of view of the rest. Example In our example, we multiply by, the limit then gives and therefore. ii): Method specific values Another method is to simply take certain values for (different from the poles) and thus have a system of equations that will determine the missing odds. Example In our example, let's take: and so. Note: in general, you need to create a system out of as many equations (independent) as there are still coefficients that need to be determined. (iii): By identifying a common method that still works but is not always the fastest, consists of rewriting the amount of simple items into a common denominator, that is, and defining coeff. the same powers of the left member (odds) and the right member (multiplied by some factors). Thus, we get a system of linear equations, the solution of which gives odds (no). Application to the calculation of primitives With the technique studied in this chapter, you can integrate any rational function. Indeed, we begin by simplification of irreparable factors, to now be able to assume irreparable. Then, in case we do the Euclidian separation to have with Finally, we break into simple elements. Thus, we just have to find primitives for two types of simple elements, and the first integral is not a problem, it is primitive, if and if you consider, therefore, the second type of integral. First it is written in the form with and . Thus, the first term has a form, with primitive (resp. for). All that has yet to be calculated is primitive. To do this, we will return by changing the variable to this integral with and with, posing consistently then). To calculate, we'll pose. Justify this variable chgt! For it is primitive. Otherwise, one makes integration part of the factor to reduce the exhibitor by 2: where the last line is obtained by passing everything in the left limb and then dividing by factor. With and, we Finally, allowing, with, to calculate for everything. Note In practice, variables change one at a time. Example One will write, for example, with . Primitives of rational functions and definition He said that it is a rational function, and if there are polynomes (in 2 variables) (, the same for ) such as . Example: here, . . Integration method: We distinguish three cases (mnemonic assistance: a new variable every time invariant under the conversion under consideration) if, one represents (invariant, or) if, one represents (invar., or) if, one represents (invar., but, sign chgt) An example. We pose, so we come to a simple rational faction for integration and we finally replace the result. Other rational factions In the following cases, you can still go back to the search for a primitive rational faction: Theorem a): one represents . C, we find a rational fraction of an inch b) with: we pose, and we still find a rational fraction in . c): The root is converted into one of the following forms: one then poses: one then poses: one then poses or in each case, one falls on the rational share of one of the types above (with or ). Example: we have, so we'll ask where, and go: Previous full calculation: The practice of a complete calculation Maximilian_F.Hasler Maximilian_F.Hasler décomposition en éléments simples. decomposition en elements simples fractions rationnelles. decomposition en elements simples dans c. decomposition en elements simples fractions rationnelles pdf. decomposition en elements simples cours. decomposition en elements simples pdf. decomposition en elements simples methode. theoreme de decomposition en elements simples