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F. Authora,\*and S. Authorb

*aAddress of the first author.*

*bAddress of the second author.*

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**Abstract.**Abstract of the article should be typed here with 8pt and Times New Roman

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# 1. Introduction

The collocation method for Volterra integral equation was introduced and studied in [4,5,6,7,8]. Other concept of integral equation are given and studied in. e.g.  [1]. This leads us to the idea of developing method for Fredholm-Volterra integral equation with weakly kernels. In this paper we consider the problem of FredholmVolterra-Fredhom integral equation with weakly kernels. The structure of this paper is as follows. In Section 2 we present the basic concepts of our work. In Section 3 we show the Gronwall inequality and convergence of collocation methods is shown in Section 4.

# 2. Basic Concept

This paper will be concerned with high-order collocation methods for the

Fredholm-Volterra integral equations (FVIEs)

|  |  |  |
| --- | --- | --- |
|  |  | (1) |

where is the unknow function whose value is to be determined in the interval the kernels and are lipschits continuous in their variable and and are unbounded in the region of integration but integrable over

The following notation and methods were introduced in [2,3] and will be used throughout this paper. The collocation methods generate, as approximation to the solution of (1) elements of the polynomial spline space

|  |  |  |
| --- | --- | --- |
|  |  | (2) |

associated with a given partition

|  |  |  |
| --- | --- | --- |
|  |  | (3) |

of the interval . Here, is the set of real polynomials of degree not exceeding and we have set and (the set of interior grid points). The quantity is often called the diameter of the grid If all then the grid is called a uniform mesh.

The desired approximation to is the element satisfying

|  |  |  |
| --- | --- | --- |
|  |  | (4) |

where with

where are collocation parameters.

# 3. A Generalized Grownwall-Type Inequality

Throughout this paper, where is an integer, will denoted constants which are independent of .

**Definition 3.1.** Let and set

|  |  |  |
| --- | --- | --- |
|  |  | (5) |

where . The functions are called the iterated kernels associated with the given kernels and .

**Definition 3.2**. If the functions and satisfies

|  |  |  |
| --- | --- | --- |
|  |  | (6) |
|  |  | (7) |
|  |  | (8) |

where is a certain integer, then and are said to satisfy conditions .

**Theorem 3.1**. Let be a constant, and Let the function satisfy to condition . The function is defined as

|  |  |  |
| --- | --- | --- |
|  |  | (9) |

where the is given by (3) and if the function satisfies the integral inequality

|  |  |  |
| --- | --- | --- |
|  |  | (10) |

then it can be bounded by

|  |  |  |
| --- | --- | --- |
|  |  | (11) |

furthermore, if then

|  |  |  |
| --- | --- | --- |
|  |  | (12) |

**Proof.** Consider

|  |  |  |
| --- | --- | --- |
|  |  | (13) |
|  |  | (14) |

Where and .

Multiplying (13) by and integrate from to and multiplying (14) by and integrate from to so we have

or

|  |  |  |
| --- | --- | --- |
|  |  | (15) |
|  |  | (16) |

By adding (15) and (16) we obtain

From (10) we have

Repeating the above procedure, we have

From (8)we have

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | (17) |

where , nothing that from (9) and (17) we obtain

where ,. The above inequality is the standard discrete Gronwall inequality which yields (12).

# 4. Convergence of Collection Methods

Throughout this paper, we write as shorthand for the inequality that and are positive constants.

**Definition 4.1**. If the functions and satisfies condition and

|  |  |  |
| --- | --- | --- |
|  |  | (18) |
|  |  | (19) |

where , then and are said to condition .

# 5. Conclusion

Conclusion goes here.

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