Chapter - 1

Introduction
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Introduction and Objectives

1.1 Introduction

In the early days knitting was an art, since all knitted fabrics were fashioned by hand and the aesthetic and performance of the end products were depended entirely on the skill, dexterity and artistic ability of the knitter. In the last few decades, the knitting industry had witnessed a number of rewarding technological advances that have transformed knitting from an art, requiring the skill and experience of the knitter, to a more efficient industrial technique. The scientific and technological approaches have not only resulted better fabrics and machines but also made development of knitting sciences for producing a finished knitted fabric of desired characteristics and dimensions.

Many attempts have been made in recent years to rationalize the knitting process. The study of geometry and dimension of the knit fabrics has spanned about ninety years to throw light on geometrical relationships of plain-knitted structures. The most important and informative study which has provided a useful tool for the study of many fabric properties, is the work of Munden. Subsequently many others have also shown that loop length and loop shape factor are the most important parameters of a knitted fabric and courses per inch, wales per inch, and loop length should be related to each other by dimensionless constants (K-values). It is also established that the dimensional parameters of the knitted fabrics change with the state of relaxation and the different states of relaxation are dry relaxed, wet relaxed and fully relaxed (tumble dried). Type of fibre has some effect on dimensional properties and constants under different states of relaxation.

Although scientific studies on dimensional properties of double jersey structures, particularly 1 x 1 rib fabric started long back along with the study of single jersey, relatively much lesser information is available in the published literature. The configuration of the rib loop unit or structural knitted cell (SKC) is completely different to that of the plain loop. From the limited information it is understood that double jersey structures also demonstrate the similar trend and
behaviour in many respects like single jersey structure. As the structure is different, knitting constants are much higher and moreover the knitting constants to some extent vary from worker to worker.

One of the most important tools in the scientific study of knitted fabric structural parameters is to develop the model of the loop unit (SKC). Further development of the geometry of the knitting zone is essential for making the loop model in the machine state. Although modeling of loop formation of 1x1 rib on dial and cylinder type machine (circular) along with necessary knitting zone geometry has been carried out in the recent past, no such information is available for 1x1 rib knitting in flat bed machine. The loop model helps us to calculate the theoretical length of loop at any point inside knitting zone, particularly at the knitting point. Once the loop length is defined, it becomes easier to predict the dimensional parameters of the knitted fabric such as courses and wales per inch, stitch density, loop shape factor, tightness factor, weight per square metre etc.

Traditionally wet relaxed fabric is further washed with detergent at 60 – 80°C and tumble dried at around 60°C for obtaining full relaxation. But with the advent of basic sciences it is the high time to establish some new technique of getting fully relaxed fabric.
1.2 Objectives of the work

As the determination of loop length and dimensional parameters are of prime importance in defining the end use of the knitted fabrics, the present study is the continuation of the earlier studies in this field. So the objectives of the present research work are:

1. To develop a geometrical model of the 1 x 1 rib loop unit (SKC) in flat bed double jersey machine.

2. To establish the dimensional constants of 1x1 rib knitted fabric made in both flat and circular bed machines.

3. To investigate the relationship amongst the different parameters of 1x1 rib knitted fabrics.

4. To incorporate the principle of ultrasonic wave for obtaining fully relaxed fabric.