The effect of machine embroidery variables on the appearance of waterproof fabrics

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Abstract:
The manufacture of fabrics and textiles is one of the industries that has witnessed a great development in recent times in the whole world significantly, which has led to the production of many types of fabrics and textiles with special characteristics such as Waterproof. This type of waterproof fabrics has become one of the most important fabrics widely used in the field of ready-made garments, especially for the production of winter jackets, which are known commercially as (pump jackets), which are used by various categories and ages, women, men and children. This is due to its distinctive appearance properties in addition to its ability to prevent water penetration with the ability to ventilate the body by allowing the absorption of sweat and the exit of water vapor. This type of fabric is usually coated with a waterproofing material such as rubber, polyvinyl chloride (PVC), polyurethane (PU), acetyl silicone, fluoropolymers and waxes, so it requires a high technical level in dealing with it, during its production stages or during its decoration with various decorative methods. Machine embroidery is one of the most appropriate decorative methods used to add a distinctive decorative character to these fabrics, making them richer, but some technical defects of that process may appear, which directly affects the appearance of the cloth and distorts its surface due to its special nature, hence the idea of Research to study the effect of machine embroidery variables on the appearance of waterproof fabrics as an attempt to set standardized standards for embroidery. The research problem can be summarized in the following questions: 1- What are the natural and mechanical properties of waterproof fabrics? 2- What is the effect of the difference in the density of the machine embroidery stitches on the appearance of the waterproof fabrics? 3- What is the effect of the difference in the type of yarn used in machine embroidery on the appearance of waterproof fabrics? 4- What is the effect of the strengthening methods used in machine embroidery on the appearance of waterproof fabrics? 5- Access to the best technologies for dealing with waterproof fabrics. Research objectives: 1- Determine the natural and mechanical properties of waterproof fabrics. 2- Determine the effect of the difference in the density level of the machine embroidery stitches on the appearance of waterproof fabrics. 3- Determine the effect of the difference in the type of machine embroidery yarn on the appearance of waterproof fabrics. 4- Determine the effect of strengthening ways on the appearance of waterproof fabrics. 5- Determining the best techniques for automatic embroidery on waterproof fabrics, which achieve the highest appearance. Research Significance: The results of this study are useful in overcoming the technical defects that occur during machine embroidery on waterproof fabrics. And identifying the aspects and limitations in it, which may result from the wrong choice (for the level of stitch density - the type of embroidery yarn - strengthening ways). This keeps preserving the aesthetics of the fabric and the appearance of the embroidery on it. Methodology: The current research follows the experimental approach to suitability to achieve the research objectives. Results: By studying the effect of the machine embroidery variables (stitch type - stitch density - embroidery yarn type - strengthening methods) on the appearance of embroidery on waterproof fabrics, it was found that: -- The best effect of the stitches and densities of machine embroidery on the appearance of the embroidery on waterproof fabrics is the Counter stitch with medium density (1.50), followed by the Run stitch with high density (0.80), and finally the Satin stitch with low density (0.85). - The best types of machine embroidery yarns for the appearance of embroidery on waterproof fabrics is silk thread, followed by polyester thread, then metallic thread. - The best strengthening methods when embroidering on waterproof fabrics are strength with paper with non-stick wadding, followed by strength with non-stick wadding, and finally strength with paper.

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