MOVING FRAMES IN DIFFERENTIAL GEOMETRY

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An introduction to Elie Cartan's method of moving frames will be presented in the context of smooth surfaces in $\mathbb{R}^3$. Through the use of differential forms, the basic invariants of surfaces will be derived in a coordinate-free manner. A simple proof of Gauss' Theorema Egregium will be demonstrated, which states that the curvature of a surface depends not on a particular embedding of the surface in $\mathbb{R}^3$, but only on the first fundamental form. The only prerequisite is basic familiarity with smooth manifolds and differential forms.