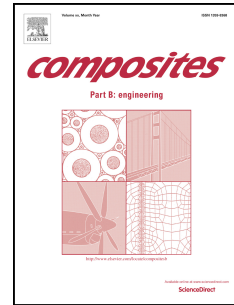


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## Shear Properties of Polyurethane Ductile Adhesive at Low Temperatures under High Strain Rate Conditions

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### Abstract

The shear properties of the polyurethane adhesives at room temperature (RT) and low temperatures under different loading speeds were experimentally studied by thick adherend shear test (TAST) specimens. The shear strength of the polyurethane (PU) adhesive decreases with the temperature reducing at quasi-static conditions. The ultimate shear strain also shows a decreasing trend with the decrease of the temperature. With the loading speed increases, the shear strength of the adhesive increases significantly. When the loading speed increases to 1000 mm/s, compared with the data under quasi-static conditions, the strength of the adhesive increases by 177%. Under the impact conditions, the strength of the adhesive at low temperatures decreases a lot compared with that at RT. The mechanical behavior of the TAST specimens under impact loadings at different temperatures were reasonably predicted by the 3D finite elements method by ABAQUS. It is concluded that the shear strength of adhesive at RT under quasi-static cannot be used to design and analyze the adhesive joints at low temperatures under impact loading conditions.

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