

Continuous Dynamic Analysis (CDA) Option



Continuous Dynamic Analysis (CDA)

Option for the T150 UTM System

Until recently, accurately determining dynamic properties for specimens at the nanoscale has been limited to fixed-strain investigations — posing significant technical challenges for improving the understanding of material behavior.

The Continuous Dynamic Analysis (CDA) option on the T150 UTM provides a simple means of determining dynamic properties, such as storage and loss modulus and $\tan \delta$. This option utilizes a technique whereby a nanomechanical actuating transducer head superimposes a high frequency oscillatory force onto the nominal force. The amplitude of the oscillation is measured by a capacitive sensor that is integrated into the nanomechanical actuating transducer head. The CDA option can measure complex moduli over a range of frequencies.

The CDA option offers a direct, accurate measurement of the specimen's stiffness at each point in the experiment, enabling mechanical properties to be determined continuously as the specimen is strained. By measuring both the amplitude and phase relationships between the load and displacement oscillations, the CDA option makes it possible to determine storage and loss modulus. The option enables T150 UTM users to gain access to dynamic properties information continuously throughout the force curve, providing a wealth of information on the material's response.

Features and Benefits

- + Allows mechanical properties of the specimen to be determined continuously as specimen is strained
- + Allows complex moduli to be measured at various preload values over a range of strain
- + Operates over a range of frequencies, allowing better understanding of viscoelastic response of materials

Applications

- + Dynamic studies of compliant fibers
- + Dynamic studies of biological materials
- + Dynamic studies of polymers and composites

T150 UTM

The state-of-the-art Keysight T150 UTM enables researchers to understand dynamic properties of compliant fibers via a large dynamic range in the industry and the high resolution on the market (five orders of magnitude of storage and loss modulus). It also lets researchers investigate tension/compression properties of biological materials via the CDA option.

T150 advantages include fast, accurate generation of real-time test results, understanding of strain-rate-sensitive materials and time-dependent response, and improved statistical sampling in biomaterials applications.

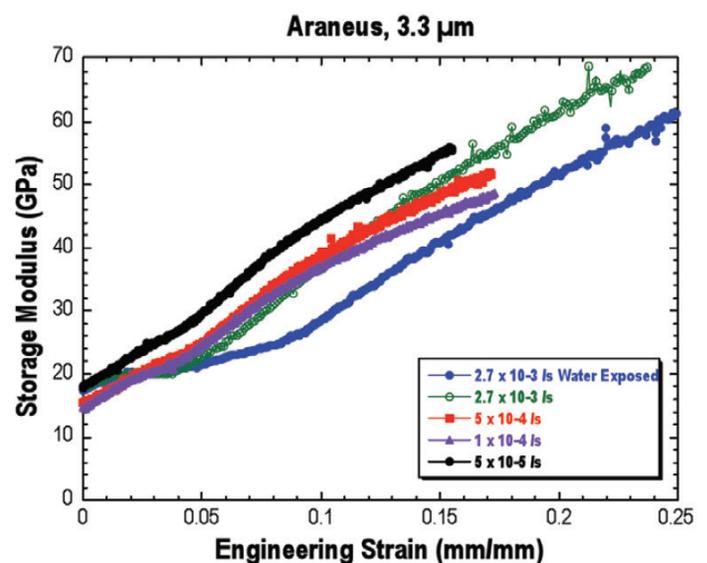


Figure 1. Viscoelastic time-dependent behavior of small diameter compliant fibers using the CDA option over a range of strain

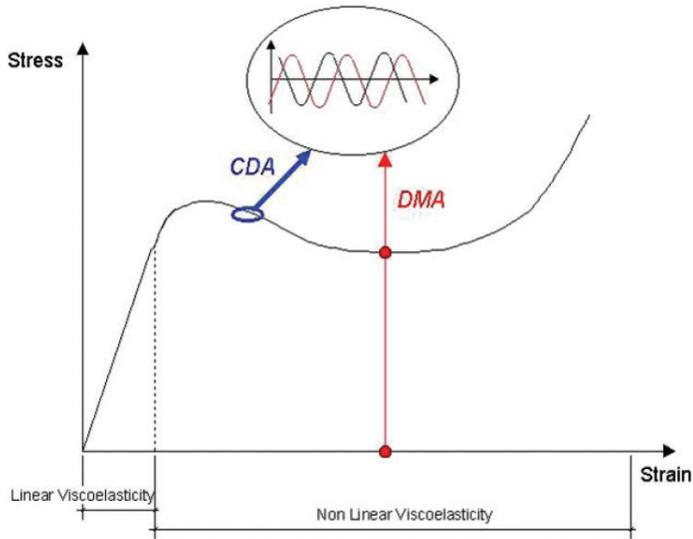


Figure 2. The T150 UTM system with the CDA option imposes a small oscillation on material that is being simultaneously subjected to a variable quasi-static strain, thereby providing material properties over a range of strain in one experiment

CDA Option specifications

Force amplitude range: 0.1µN to 4.5mN

Frequency range characterization of instrument dynamic response (sample dependent): 0.01Hz to 200Hz

KLA SUPPORT

Maintaining system productivity is an integral part of KLA's yield optimization solution. Efforts in this area include system maintenance, global supply chain management, cost reduction and obsolescence mitigation, system relocation, performance and productivity enhancements, and certified tool resale.

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