Characteristic wave resistance (R_{ChW}) is an expression for the real part of the "characteristic wave *impedance*"—if not specified otherwise, usually referring to the *transverse* R_{ChW}.

The transverse R_{ChW} can simply be calculated as

$$R_{ChW} = \sqrt{\frac{Tension\ of\ string}{Mass\ per\ unit\ length}} \ ,$$

or

$$R_{ChW} = Propagating\ speed \times Mass\ per\ unit\ length,$$

with dimension [kg/s].

It is easy to understand the dimension [kg/s] if you imagine a very long, tensioned string, shook in one end. If you weigh the total string mass that has been moving within one second, you have got the R_{ChW}.

Example: On the open violin A-string waves move 440 times per second twice the string length, that is 440 Hz × 2 × 330 mm = 290.4 meters per second(!). If the string is a Eudoxa, weighing 0.6 grams per meter, you get R_{ChW} = 290.4 [m/s] × 0.0006 [kg/m] = 0.17424 [kg/s], which is a relatively low value for a violin A-string. With low values of R_{ChW} you will normally feel less string resistance when playing, but less energy is transferred to the body of the instrument.

There is also a "characteristic wave resistance" for *torsional* waves, but because this one is much more complicated to calculate, we shall skip these expressions here. We will only mention that the greater R_{ChW} is for torsional waves, the more energy will go into *transverse* waves, because the bow's efforts on the string surface will be exciting both kinds of waves in a ratio inverse to their corresponding characteristic wave resistances.

Torsional waves are (as far as we know) not transferred directly to the body of the instrument, but still have an important function during attacks, where they provide extra damping, thus facilitating clean tone onsets.