Dynamic AFM (often called "tapping mode"), especially when performed in air, often has two distinct regimes of operation: so-called attractive and repulsive regimes. For some cases, the attractive regime involves only long-range interactions (van der Waals, electrostatic) such that a mechanical, repulsive contact is not made. You might call this "true" non-contact. In other cases there is a very light contact, but the attractive forces dominate over the repulsive contact forces such that the regime is net attractive (time integrated force over one oscillation cycle). In other cases there is no solid-solid contact but the tip is actually dipping into a liquid-like contaminant layer (water, hydrocarbons) and these capillary forces are strongly attractive. Some have called this operating regime "dipping mode". But in most cases a solid-solid mechanical contact is being made and this repulsive interaction dominates the attractive forces such that the net interaction is repulsive. This is sometimes called "true tapping". Others use "intermittent contact" mode, but again this implies solid-solid contact, whereas the user may or may not have stabilized this interaction.

To confuse matters more, "tapping mode" was a trademark (of the former Veeco / Digital Instruments or "DI"), whereas "non-contact" may be a product descriptor for other vendors but meaning the same thing; these vendors could not call their capability "tapping mode" because it was trademarked. So in the experimental section of journal articles you will see people say they were doing "tapping mode" because their product literature calls it that (perhaps even Tapping Mode™), whereas in other papers people say they were operating in non-contact mode because their product literature calls it that. (Even worse, some of these latter instrument companies were later bought by Veeco. What was trademarked was of course not the nature of interaction, but rather the particular hardware/software implementation.) Other instrument companies (e.g., Agilent, formerly Molecular Imaging or "MI") call it "AC mode" because the signal driving the feedback is the amplitude of the time varying deflection, rather than the quasistatic deflection (as used in contact mode). This is a more "correct" name, rather than "tapping mode" or "non-contact mode". MI further differentiated two hardware implementations, one where a special, magnetostrictive-coated cantilever is driven by an AC magnetic field ("MAC mode" for Magnetic-AC) and another where an ordinary cantilever is driven by an ultrasonic vibration through the clip holding the cantilever chip ("AAC mode" for Acoustic-AC).

There is an annual "Non-contact AFM" conference. In this case, most of the investigators are using ultrahigh vacuum AFM systems and operating under a different feedback signal: the resonant frequency of the oscillator. (This is sometimes called "frequency modulation" AFM, as opposed to "amplitude modulation", as is used conventionally for the modes in the above paragraph.) Here the interaction is purely attractive (not even light contact is made) and further demarcated into long-range (e.g., van der Waals) and short-range (e.g., as described by a Morse potential meaning quantum mechanical chemical bonding or electron orbital overlap or hybridization). Some would say it is best to reserve the term "non-contact AFM" for only this type of very fundamental and exquisitely controlled work. Where such systems are available they usually are not used for ex situ studies, only in situ where the sample surface is both prepared and imaged under vacuum.